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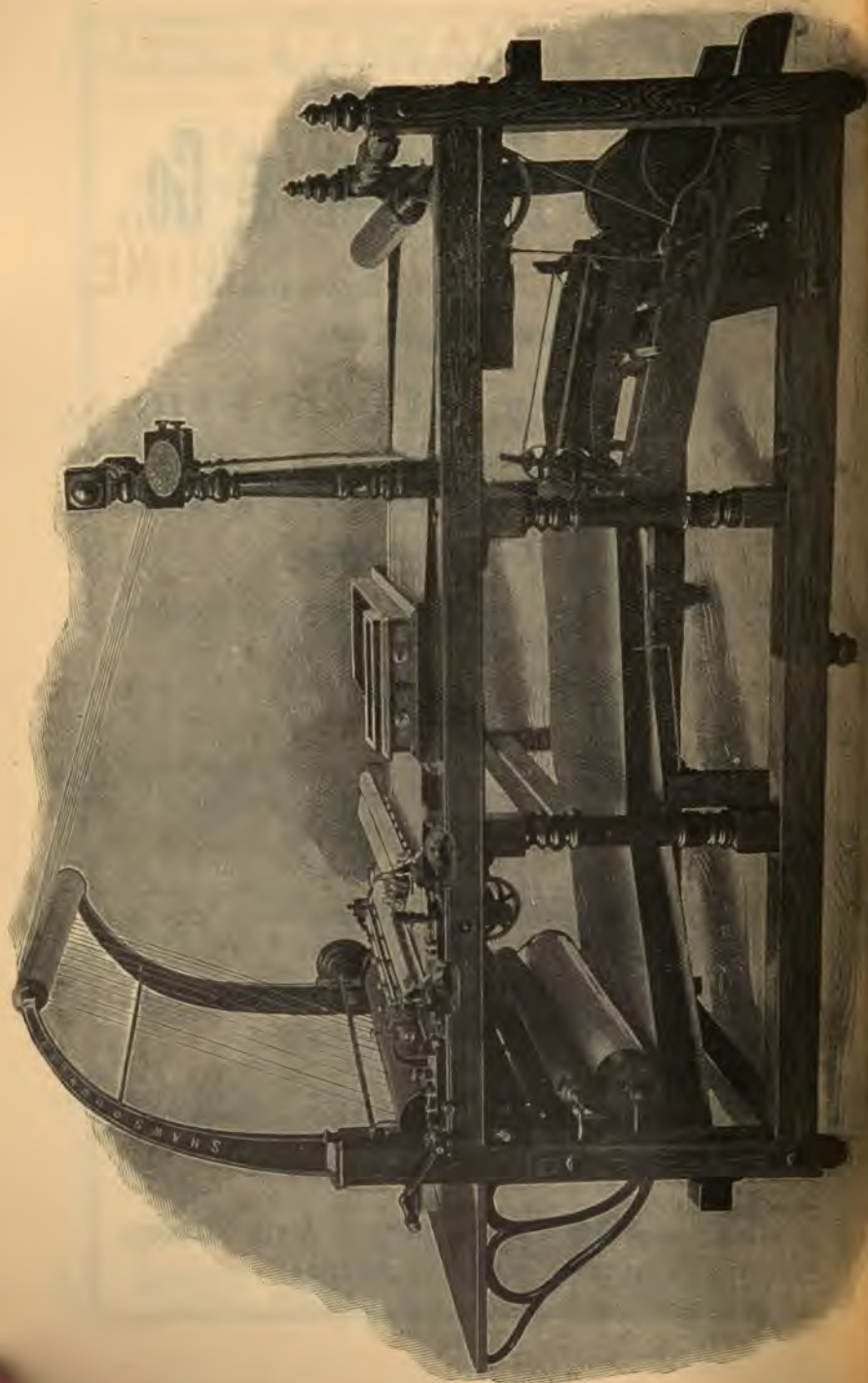
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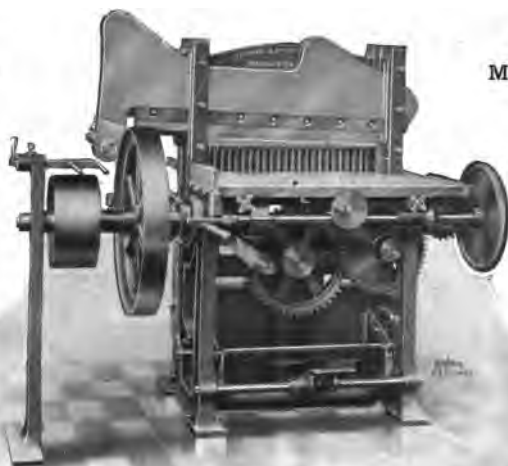
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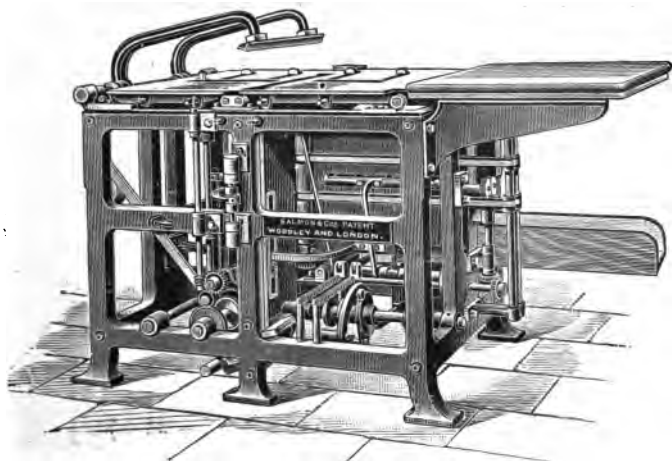
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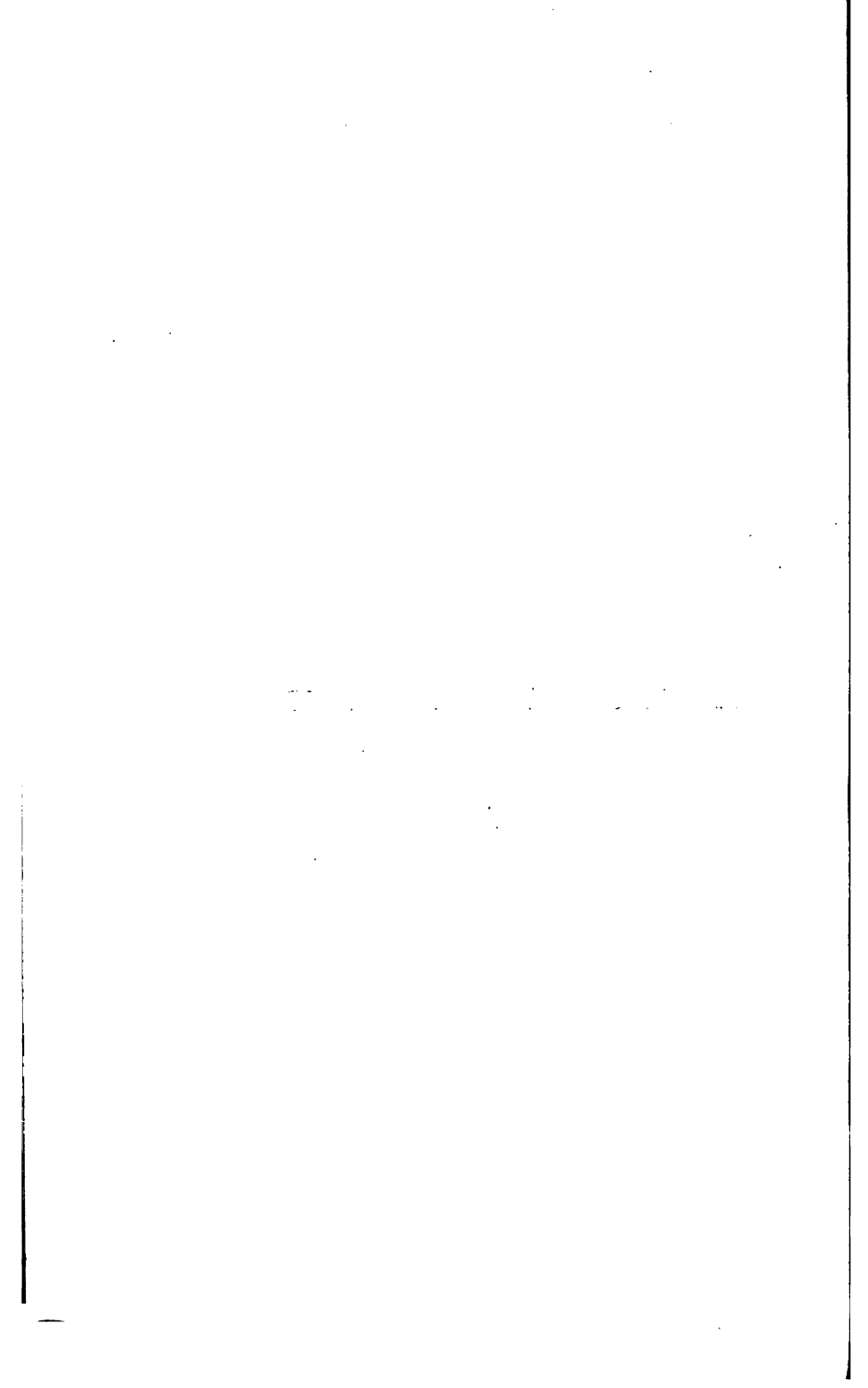
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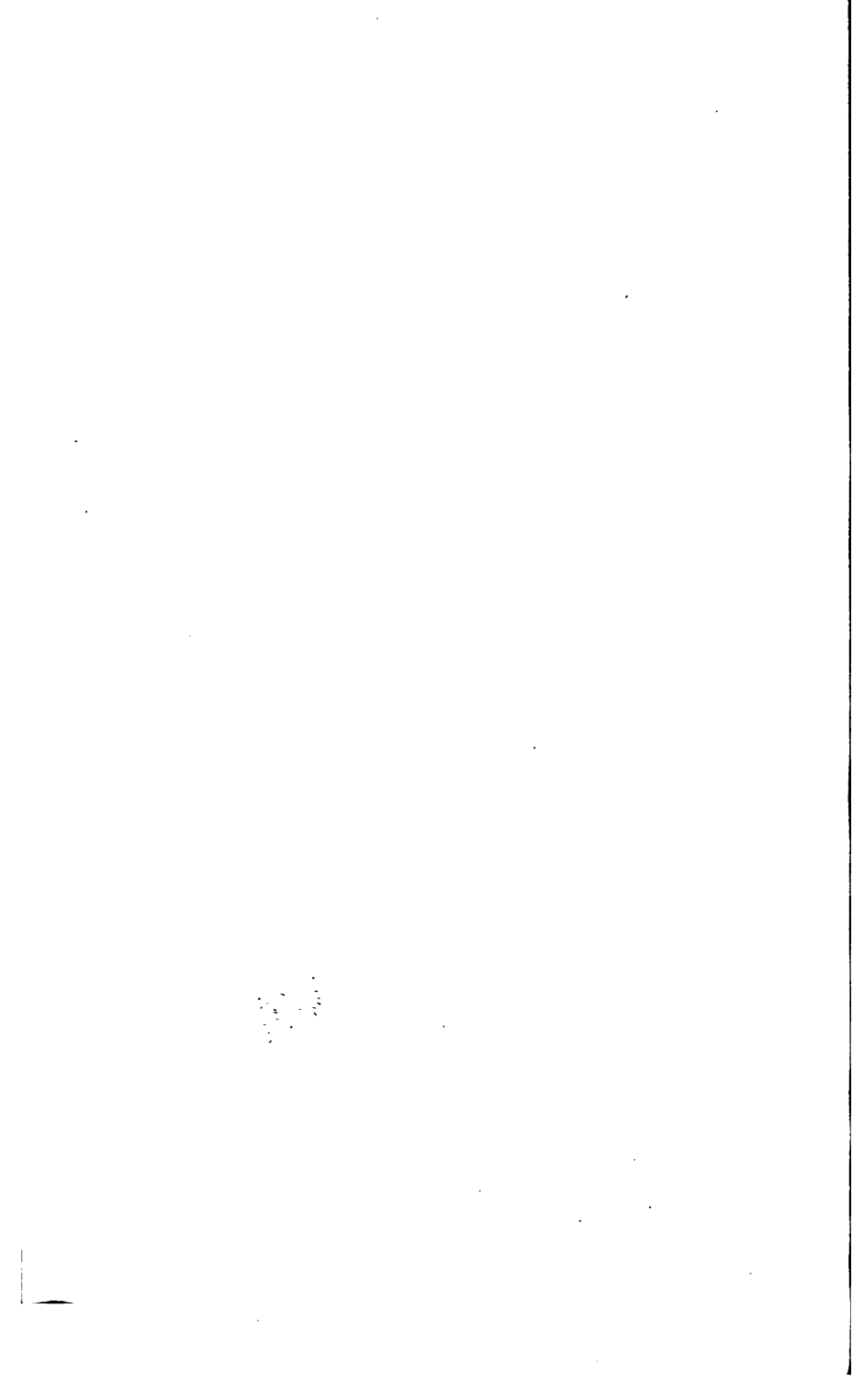
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TO
MY DEAR FRIEND
THE LATE
EBENEZER BEGG, OF GLASGOW.

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PREFACE.

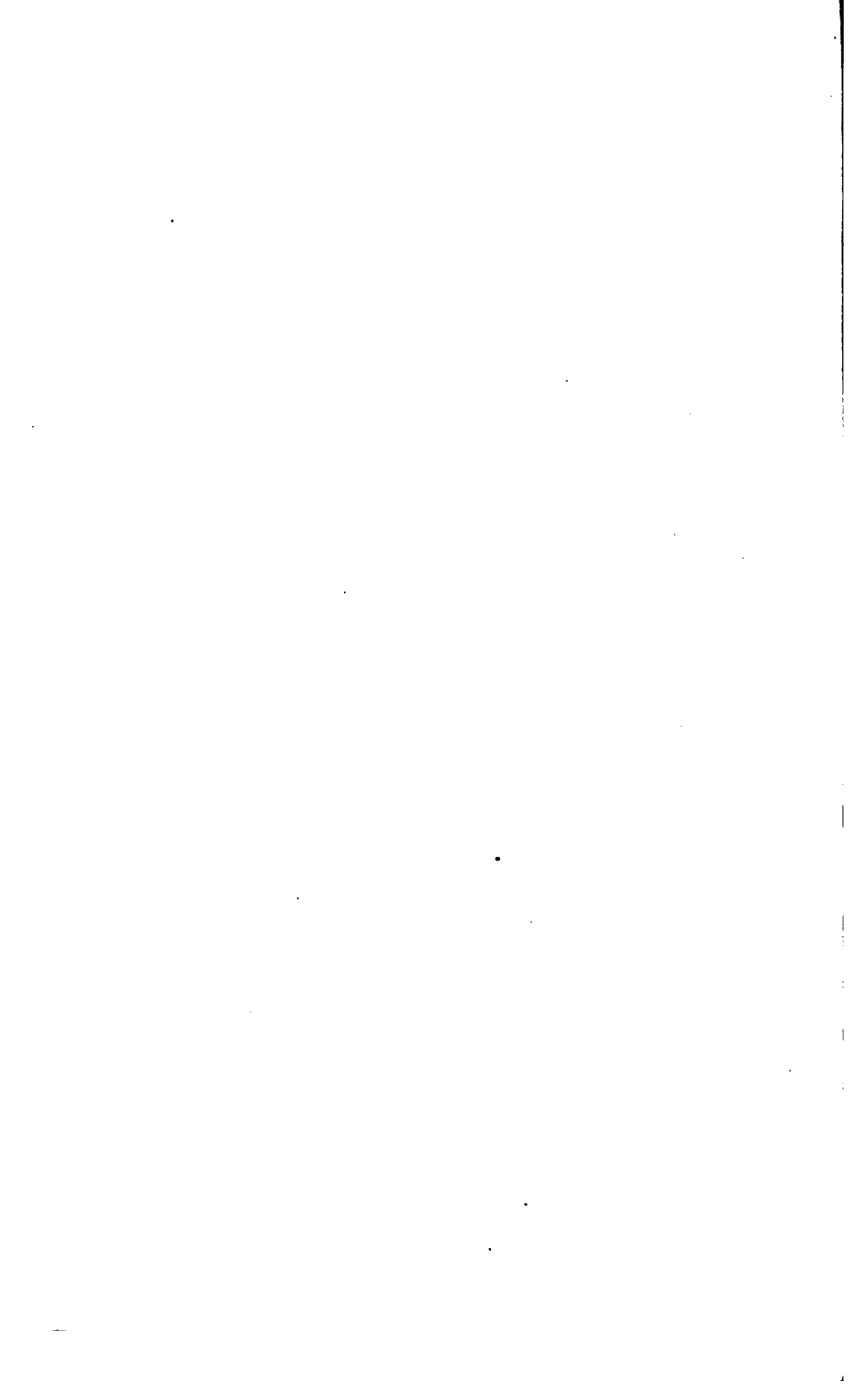


IT has long since been admitted by many connected with our craft that a technical hand-book on the trade is needed, and it is with this end in view that I submit this work.

When Mr. Arthur Shaw approached me with the request that I should write what I know concerning my craft, I was somewhat loth to undertake the task by reason of the difficulties with which such a work bristles. By the aid of many friends, however, I have surmounted them, and I now ask their acceptance of the thanks both of myself and the publishers. Especially is this so in the case of the two contemporary writers whose works appear in this book.

Should the work appear to savour of the "personal pronoun," it must not be understood that I wish to take unto myself the whole of the credit of the various systems which are shown throughout these pages, but rather because I do not want the reader to suppose that I claim them as being the best.

S. R. S.



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CHAPTER I.

COUNTING AND PREPARATION OF JOBS.

MUCH of the success of the daily routine of the ruling room depends upon the correct counting and preparation of the various jobs which come into it prior to their being placed on the machine. It is indeed a serious matter if, in the case of a job which took a number of hours to set, it is found, when done, that sufficient paper has not been allowed for spoilage—pastedowns, if bookwork ; sheets for measuring and making-ready, if a printed job ; file copies for future reference ; or by a miscount a job is found to be short when it comes to be paged. On the other hand, the warehouseman, in the stress of hurry and bustle, may be at fault by giving a paper double the size of that stated on the ticket, although the number of sheets given may coincide with the number allowed for on the ticket.

The actual process of counting is to a large extent a matter of personal taste, and in almost every instance the style or system adopted by persons engaged in this branch of the trade differs in some respects. Some count in twos, some in sixes, by reason of every fourth count making a quire, others in fives ; whilst the best method I know is to count in lots of five each and reckon them from one onward numerically, thus, 1 = 5, 2 = 10, 3 = 15, 4 = 20, 5 = 25, 10 = 50, 20 = 100, and so on. In the case of manifold paper, however, by reason of its very flimsy nature, even the most expert counters forego all rules which govern this vocation, and practically count as best they can.

In the counting of jobs which cut two, four, or more out of the quad or double sheet, it is only necessary that one of

the cuttings of each ream be counted. For instance, if we have a job of 20 reams of demy, given out in quadruple, *i.e.*, four sheets in one, one quarter only of each of the quad reams should, when cut, be marked by the cutter. This lot should be counted and the number arrived at multiplied by four.

It is not enough, however, that the persons undertaking this responsible position should become adept in this department alone. They must be possessed of a sufficient knowledge of the trade to enable their allowing without extravagance enough overs, according to the nature, size of sheet, and quantity of a job, to ensure its being turned out without complaint so far as quantity is concerned. They must have a good idea of the qualities, sizes, and sub-divisions of paper; must thoroughly understand that to every printed job a sheet is required by the compositor for the purpose of measuring off; must be aware that in the case of an ordinary index the letters I and X are omitted unless ordered to be retained; that thirteen sheets are the nett quantity necessary to it, with an additional sheet for pastedown; whilst if it be for a copying book, fifteen sheets must be allowed, this latter sheet being for the purpose of strengthening the book by guarding it round the first section, and in both cases a couple of sheets must be allowed for spoilage in ruling if feint-lined only. If it be down-lined more overs will be required, and if printed also, more still. They should also know that the principals consist of the letters B, H, M, S and W, the extra leaves being allowed according to the order of the customer; that if an index be vowelled, five leaves must be allowed to each letter. They must also know that in books containing two or more patterns, the last and first pages of the different patterns will, unless otherwise ordered, be pasted together, thus forming a thick leaf, and these thick leaves must be allowed for according to the number of different patterns appearing in the book, *i.e.*, one leaf to each pattern; that in the case of book-work generally one sheet to each book must

be allowed for pastedowns to the end-papers. The importance of pastedown allowances will be seen at once if one considers that in an order for 100 books which require to be folioed, 100 leaves nett must be reckoned with before counting is commenced. Paper-counters must also be aware that in the event of a foolscap folio guard book requiring an index, demy reduced to $13\frac{5}{8}$ ins. by $8\frac{5}{8}$ ins. will be the size necessary for making up, for whereas the size of a foolscap folio book is $12\frac{1}{2}$ ins. by 8 ins., that of a foolscap folio guard book is $13\frac{5}{8}$ ins. by $8\frac{5}{8}$ ins., or, in board, 14 ins. by 9 ins.; this extra size allowance is to permit of the insertion into the book of sheets of the standard size. Other sizes of guard books vary correspondingly. They must also possess a fair knowledge of arithmetic, and be reliable at calculation.

To illustrate this, let us assume that we have an order for one gross of duplicate memo. books, each book to consist of 250 leaves of thin and 250 leaves of thick papers alternately, and to be 10 ins. by 8 ins. To arrive at the nett quantity of sheets necessary to the job, multiply the number of sheets by the quantity ordered and divide the multiple by the number of leaves which can be got out of a sheet, thus : $250 \times 144 = 36,000 \div 4 = 9,000$, and we have a total of 9,000 sheets each nett of thin and thick papers. It will be seen that I have divided the multiple by 4, on account of 4 leaves being got out of the sheet. If it be desirable to find the number of reams required, the number of sheets, viz., 9,000, must be divided by the quantity of sheets per ream.

CHAPTER II.

DISSECTION.

DISSECTION is the technical term applied to the method of so ruling the pages of a book, a given number of which are of different patterns, that when sewn it will open out in the order desired.

Suppose, for example, that we have an order for 1,000 bank pass books, foolscap 8vo size, of 24 pages each. The first three pages are to be reserved for "the name of the depositor," "the name of the bank," and the "Conditions of Banking" to be printed upon them; pages 4 to 23 are to be ruled the ordinary bank book pattern, viz., box-head and feints, and down columns for date, amount of deposit in writing, and £ s. d. columns for the amount in figures, whilst page 24 is to be blank. Beyond being sewn in one section, the binding need not concern us. Dissection, then, is the art of arrangement of the pages during the process of ruling these books, and those of like character, upon the size of sheet most suitable and most profitable.

Firstly, the ruler should ascertain how many pages are required to complete the job by multiplying the number of pages in a book by the quantity of books ordered, thus, 1,000 24's = 24,000. Then, remembering that the books are foolscap 8vo, or to allow for the back in binding, foolscap 8vo fly, or foolscap 4to sheet, we must next find the quantity of foolscap 4to sheets necessary by dividing the number of pages, 24,000, by 4, as there are 4 pages of foolscap 8vo in a sheet of foolscap 4to, and the result is 6,000. Having determined upon the size of the sheet in which to work the job, which in this case would be foolscap, divide again the

number of 4to sheets by 4, there being four 4to sheets in one full sheet, and this gives us the total nett quantity of foolscap sheets required, *i.e.*, 4 into 6,000=1,500. Remembering again that foolscap 8vo is the size ordered, that foolscap 8vo fly is the size the ruler must reckon with, that foolscap 8vo fly is the equivalent of foolscap 4to, and that there are four pages of foolscap 8vo in a sheet of foolscap 4to, we divide the number of pages required per book, *viz.*, 24, by the number of pages in the 4to sheets, thus, $24 \div 4 = 6$. Six sheets, then, are required to make up the book of 24 pages.

Having proved the reckoning to make doubly sure of its being correct, procure six sheets of scrap paper and fold them together once ; this will give 12 leaves, or 24 pages (the number required in the book). Fasten them together at the fold by means of a pin, in a similar manner to which it would be wire-stitched, but without bending the ends of the pin over, and proceed to make up a dummy book in the following manner :—On the first page put the figure 1 in the top right hand corner, and in the centre of the page write the words, “ Name of Depositor.” Turn over leaf in the same way in which you would open an ordinary book, and in the top left-hand corner put the figure 2, and in the centre of this page write the words, “ Name of Bank.” On the opposite page put the figure 3 in the top right-hand corner, and the words, “ Conditions of Banking ” in the centre. Turn over leaf again, and in the top left-hand corner of the page put the figure 4, whilst in the centre of this page must be written the words, “ Bank Book Pattern,” and this process must be followed out on all the pages up to 23, except that the numbers of the pages will run on in proper numerical order. Page 24, however, is to be blank, that is, neither ruled nor printed, so that it will be numbered 24, and the word “ Blank ” written upon it. I might point out that there is no especial reason for numbering the pages in the top corners, except that it is the position in which they would appear in a machine-paged

book ; some, in fact, number in the bottom corner. It is merely a matter of opinion.

Having checked the dummy by the order, see if all the pages are numbered correctly. This is a most important point, for in the case of numbering a quantity of 32 or more pages one is apt to get confused, and either skip a number or repeat one where it ought not to be repeated ; either of these errors would cause much trouble and spoilage. Take out the pin, release the sheets and lay them on the table, starting with the outside sheet and working to the centre one. It will be seen that the two outside sheets constitute pages 1 and 24, 2 and 23, 22 and 3, 4 and 21 ; this represents both sides of the sheets, or all four pages, whilst the four sheets consisting of pages 5 to 20 are all the " Bank Book Pattern."

Below is appended a sketch of the pages as they should appear when dissected :—

Outside Sheet.

24	1
Blank.	Name of Depositor.
Fold.	

Outside.

Second Sheet.

2	23
Name of Bank.	Bank Book Pattern.

Inside.

22	3
Bank Book Pattern.	Condition of Banking.

Outside.

4	21
Bank Book Pattern.	Bank Book Pattern.

Inside.

It is not necessary for me to give a sketch of the other sheets, for all four pages of each sheet will be the same as pages 4 and 21 here shown. Next must be reckoned the quantity of paper required to the different patterns, namely, how much is to be ruled to the two outside sheets, and how much to the four inner sheets. This can be ascertained by determining the number of pages which can be worked together and then how many can be got out of the sheet in which the job is being worked.

In this case, pages 1, 2, 23 and 24, and 3, 4, 21 and 22, comprising the two outside sheets of the dummy, may be

worked together in the foolscap sheet in the following manner :

Fold the sheet into foolscap long 4to and work as sketch :—

⁴ Bank Book Pattern.	²¹ ²⁴ Bank Book Pattern.	¹ Name of Depositor.
	REPEAT.	

Outside.

² Name of Bank.	²³ ²² Bank Book Pattern.	³ Conditions of Banking.
	REPEAT	

Inside.

“ There is a best way of doing a thing, if it is but to boil an egg,” says Emerson ; so in order to portray more clearly the best imposition of the eight pages in question upon the foolscap sheet, I am making an incorrect imposition, and after doing so, will show the difference between the two :—

INCORRECT IMPOSITION.

²⁴	¹⁴	²¹
	REPEAT.	

Outside.

²²	³²	²³
	REPEAT.	

Inside.

Chambers' Dictionary defines the word “ Imposition ” as “ a laying on,” and this definition is very true, so that a “ correct imposition ” really means the laying on—or shall I say the ruling on—in the proper order for folding, of the different page patterns.

Firstly, take a sheet of paper and mark it on both sides after the manner of the outside and inside of the correct imposition already shown ; secondly, put a × under the figures 2 and 3. See sketch :—

² x	²³ ²²	³ x
-------------------	-----------------------------	-------------------

Then with the left hand pick up the sheet in the bottom corner of page 3, turn it over to the left so that the two crosses meet each other, and fold the sheet by the fore-edges. The sheet has now been reduced to foolscap folio fly, page 3 following page 2 in numerical order, with pages 4 and 21 to view. Thirdly, pick up the sheet with the left hand at the bottom of page 21, carry over to the left, and fold by the fore-edge, bringing page 24 to view, and reducing the sheet to foolscap long 4to fly. When picked up it will be seen that the pages read on in numerical order, 1, 2, 3, 4, and 21, 22, 23, 24. What I want to particularly impress upon the reader is the fact that this is a correct imposition, simply by reason of the pages falling together numerically with the two straight folds.

Let us, however, take another sheet, mark it as the outside and inside of the "incorrect imposition," and with the inside to view make the first fold as in the previous example given. This brings pages 24 and 1 to view, and as these two pages require to be outside, the whole sheet must be turned bodily over, bringing pages 4 and 21 to view, before the folding can be proceeded with. It will then fold correctly by carrying page 21 over to the left and folding by the fore-edge, but it is the unnecessary labour caused in the turning over of the whole sheet bodily which renders this an "incorrect imposition."

My readers will have great need to study the two methods in order to thoroughly distinguish one from the other. The foolscap sheet, it will be observed, gives us 16 pages, that is, 8 pages per side, so that by repeating the patterns on the bottom half of the sheet the 16 pages are utilized to the best advantage, and two copies of each of the two outside sheets of the dummy are got out of the foolscap sheet. As 1,000 copies of each of these two sheets are required, 1,000 must be divided by two in order to arrive at the quantity of foolscap sheets required for the 8 pages, namely, $1,000 \div 2 = 500$;

thus 500 foolscap sheets are required for the two outside sheets. The remaining four sheets are "Bank Book Pattern," and all four pages are ruled. It is, therefore, a case of straight running, both for cross and down-lining. The number of pages in this case which may be worked together is 16, or double the quantity of the first-named working—1,000 sheets—therefore twice the number required for the two outside sheets will be necessary, because there are four inside sheets, as against two outside sheets, thus proving that the nett quantity of 1,500 already arrived at is correct.

Before giving a further example of a somewhat different nature, let me make it clear that in the case of an order for so small a quantity as 1,000 books, the 500 sheets comprising the outside eight pages of the dummy, which have been ruled in foolscap, would not be printed in that size sheet. It would be too expensive to set up two formes for each page, or to cast stereotypes for that purpose. Neither of these courses would, I think, be adopted for a less quantity than 2,000 books, which would mean a run of 2,000, *i.e.*, 1,000 both sides; still, it would be more profitable to the ruler to work in foolscap sheet, and providing it were printed in foolscap long folio oblong ($6\frac{1}{2}$ ins. by 16 ins.), the maker-up would only have need to fold the sheet twice, and then make an inset of the centre pages.

Let us assume further that a customer wants a book making of 16 openings, repeated 12 times, to be of good quality hand-made paper, duplicate paged, and well bound. The first opening is to be devoted to his business in London, the second opening to his branch in Birmingham, the third to that in Manchester, and so on throughout the whole of the 16 openings, each opening to contain matter relative to the business or its agents in different parts of the country, and for the sake of example we will suppose that each opening be a different ruling pattern. Firstly, it must be understood that an opening is the two pages which meet the eye when a

book is opened out for the purpose of reading, or writing in, and that an opening is the equivalent to a leaf, so that 16 openings, or leaves, are the equivalent of 8 sheets, there being two leaves in a sheet of paper when folded once prior to being sewn into book form. I have not dealt with size in this instance, because the size is a matter of little moment to us ; books of this class may be anything from foolscap upwards. We may, however, for clearness, term it a demy folio. In this case, as in all cases concerning the anatomy of a book, a dummy must be made, so, remembering that 8 sheets are required to complete one set of 16 openings, and as 8 sheets would be too bulky to be sewn as one section, we must split it up into halves, and proceed with the making of a dummy of 4 sheets to each section—two 4's giving us the 8 sheets, or 16 openings required. The finding of the correct quantity of sheets per section is a matter of the greatest importance, for upon this rests the life of the book when bound, and the cost of production also previous to its reaching the hands of the binder. Having procured the necessary two sets of four sheets each of scrap hand-made paper for the making of the dummy, reverse every other sheet so that the openings will appear blue and white alternately. (It is most essential that this should be done upon hand-mades, or, in fact, upon all papers which bear distinct shades on either side, otherwise there is a great chance of getting the two shades in one opening, which would appear very unsightly.) Fold each four sheets once in the centre, and pin as in the previous example given. On the first page write the word "paste-down," turn over leaf, and in the top left-hand corner of the second page put the figure 1, for this page now becomes the left-hand page of the first opening, and in the centre of the page write the word "London"; on the third page in the top right-hand corner put the figure 1, and by its side the letter A, and in the centre of the page write the word "London." On page 4, in the top left-hand corner, put the figure 2, and in the centre of the

page write the word "Birmingham." On page 5, in the top right-hand corner, put the figure 2, and by its side put the letter A, and in the centre of the page write the word "Birmingham." It will be well if I point out that the letter A is for the purpose of defining the right-hand page pattern from the left when the dummy comes to be taken to pieces for guidance in ruling. The process of numbering the pages is to be repeated throughout the whole of the 16 openings, except, of course, that the openings must be paged numerically and worded as per the order of the customer. On reaching the last page of the second section of four sheets, which will be numbered 16 (and for clearer explanation we will word it "Foreign"), it will be seen that there is no right-hand page to mate it. So we must turn back to the first page of the set marked "paste-down," and in the corner put the figures 16, and by its side the letter A, and also write upon it the word "Foreign." After the dummy is completed comes the counting of the paper, and as 12 sets are ordered, 12 copies of each of the 8 sheets will be required, excepting the sheet marked "paste-down," and of this 13 copies will be required, the thirteenth copy being for the mating page of the last opening to "Foreign" in the book, which copy will be cut away about $\frac{1}{4}$ in. on the left-hand side of the fold, leaving pages 16A and 1 full, whilst pages 7A and 8 will be waste. The full leaf will be guarded round the last section of the book, page 16A facing page 16, and page 1 becoming the paste-down at the end of the book. Thus the nett total of sheets required for the book may be arrived at by multiplying the number of sheets required per set by the number of sets required in the book, and then adding one sheet to allow for the paste-down; thus, $8 \times 12 + 1 = 97$.

Next comes the question of overs allowance. This, it will be admitted, is a very vexing one, as hand-made paper is expensive, and jobs of this class are in nine cases out of ten estimated for. It is necessary, therefore, that there should

be as little waste as possible ; still, I should say that 50 sheets of hand-made and one quire of printing paper over would not be too many. I am assuming, of course, that the book is printed. This may seem excessive at first sight, but on close study it will be seen that it only allows three sheets per pattern, each of the eight sheets bearing a different pattern on each side, and out of this one sheet of each of the eight must be given to the compositor for the purpose of measuring off, whilst the maker-up will also require a sheet of each for file copy. The printing paper should serve for setting upon, and it must be seen that it is cut to exactly the same size as the hand-made. This point cannot be too strongly emphasised, otherwise there is a possibility of spoiling the book by not getting the " binding space " dead in the centre of the sheet. The operator would test his pens and the colour of the inks upon any scrap paper he may have by him. If it be felt that this over allowance is not sufficient, then, by all means, have more paper, for the extra cost of a few more, say eight, or even sixteen sheets, would be trifling compared to the cost of having to put the job on the machine again, should the spoilage be too great to allow of the requisite number of openings by the time it reached the hands of the maker-up. The paper must next be counted into eight lots of 18 sheets of hand-made and three sheets printing paper each, except the paste-down, and this will require 19 sheets hand-made for the purpose of binding already explained. The two odd sheets of hand-made which remain will be found extremely useful to the ruler. After this the process of ruling may be proceeded with.

A careful study of the different page patterns must be made in order that those most nearly alike may be worked in succession. Much time and trouble will be saved in this way, and the sheets must be turned either to the blue or white side according as the pages appear on the dummy. When a lot is removed from the table of the machine, if only

one side has been ruled, tie it up before handling a further lot, and pin the dummy sheet to it. It is also advisable to put in it so as to be easily seen a slip signifying whether the lot has been ruled one side only or both. This simple method will be found of great service to the ruler, and will also minimise the chance of sending a lot out unfinished. As each lot is ruled and ready to be passed on, they should be paged according to the dummy.

For further example, we will suppose that instead of ordering 16 openings, our customer wants 17 openings to his book. This would require an extra leaf in every set, and, as regards the ruling and printing, an extra sheet would be worked for the sake of convenience of size, although pages 1 and 2 need not be ruled nor printed. The third page of this sheet I should make 16A, the fourth page 17, and the sheet marked "paste-down" would be 17A. This method would necessitate this leaf being guarded round every other section in a similar manner to that already explained relative to the last section of the book. It is possible to make up a dummy of 17 sheets, thus giving two sets of 17 openings, in which a guard would not appear, viz., by working three sections of four sheets each, and one section of five sheets. But this method is not popular because it would so change about the different page patterns as to increase the cost of production by more than half over the guard-leaf system.

Another illustration is that of the 3-page "Summary" Book, a somewhat common book amongst large business houses. As this book is one which does not need to be kept for any great length of time, neither is it subjected to rough usage, a substantial machine-made paper is generally used by reason of its cheapness, and also on account of its adaptability to making-up. In this, as in the previous cases shown, a dummy is essential, and the number of sheets to allow per section for sewing must be dealt with. In this case six would be the most suitable, neither more nor less, for to

lessen it, or to increase it, would mean to reduce or increase by a sheet and half, and this would mean a guarded leaf to every section. Of course, in the event of it being a thin paper, one might go so far as to put nine sheets in a section, or should it be an exceptionally stout one, so few as three might go. Both of these latter are, however, very rare cases, and in this particular instance it will be seen that we are dealing with a substantial machine-made paper. Unlike the previous example given, this book does not necessarily require that the end-paper be pasted on to the first page. To tack it on would be quite sufficient, as each of the pages are entirely independent of the other. Having procured the necessary six sheets of scrap paper and folded them once in the centre, put the figure 1 on the first page, the figure 2 on the second page, the figure 3 on the third page, whilst on the fourth page must be put the figure 1 again, and this is repeated throughout the whole of the pages of the six sheets, numbering in sets of three. When dissected it will be seen that there are just twice as many sheets to one pattern as there are to the other, that is, two-thirds of the paper will have pattern 2 on one side of it, and patterns 3 and 1 on the left and right pages respectively, or the other side, whilst the remaining third will have patterns 1 and 3 on the left and right pages respectively on both sides of the sheet. Whatever, then, may be the quantity of sets of pages ordered, the paper must be counted into lots of two-thirds and one-third and ruled according to the dummy. Presuming it preferable to make a "paste-down" of the first page, the quantities required for ruling would still be the same, viz., two-thirds and one-third, although the arrangement of pages would be altered, page 1 taking the place of page 2, etc., as in a book of openings, whilst a guard-leaf would be required at the end of the book to complete the last set and paste on to the end-paper.

As a still further illustration we will deal with the book made up of a "set of openings" repeated a given number

of times, one opening to be devoted to "Goods Inwards" and one opening to "Goods Outwards" to constitute a set; it may be repeated *ad lib.* as per the wish of the customer. Unlike the preceding example, this book may consist either of an odd or an even number of sheets per section, namely, if a stoutish hand-made were being used and five sheets were considered sufficient, then five sheets could be used. If an ordinary azure laid, and six sheets were found most suitable, then six sheets could be put in, or more, or less, according to the quality of the paper, because all that is needed in this case is that one side of the sheet shall be ruled to the pattern "Goods Inwards," and the other side to that of "Goods Outwards." The correct alternate positions of the openings are brought about by the maker-up, who, after having seen that the side ruled "Goods Inwards" is uppermost, reverses every other sheet prior to folding into the section for sewing.

Other examples are those of the duplicate, triplicate and quadruple advice books. There is no fixed rule for the making-up of this class of books; much depends upon the order of the customer. Generally speaking, however, they are struck on the first and third pages of the sheet (excepting the manifold paper, if such be used, which by reason of its transparency is run through with the second leaf (and sometimes third and fourth leaves, if a triplicate or quad book) perforated, and a carbon impression of the manuscript matter taken. All duplicate books may be made up to sew in the section, with a thin leaf pasted in the centre of every section. For instance, if the book is to contain 200 leaves manifold and 200 leaves cream laid papers, the whole, when ready for sewing, will be collated with one sheet manifold and one sheet cream laid repeated five times. When folded it will be seen that the centre sheet, which would be cream laid, makes two successive leaves of cream laid, hence the pasting between them of a manifold leaf to throw the book into the desired order—that is, a manifold sheet cut into halves. This applies

to the first section. In collating the second section, however, a cream laid sheet would form the first, or outside sheet, and it will require five sheets cream laid to four sheets of manifold, the outside sheet of the first section forming the first leaf of the second section, and it is from this second section that we get the manifold sheet for pasting in. The book made up to this order would contain 20 sections; every other section being practically the "second" section, we should have 10 sheets manifold over when the book is made ready for sewing, and this 10 sheets, when cut into halves, would give us 20 leaves, or the requisite number of paste-ins required.

Triplicate and quadruple books may be made up in like manner, providing that manifold and cream laid papers only are used, the leaves of the latter being all of one quality, excepting that in the cases of the triplicate and quadruple double and treble the quantity respectively of cream laid will be required over that of manifold.

In the case of a triplicate book of three different colours of papers, say manifold, pink, and cream laid, the paper must be ruled on the first and fourth pages of the sheet only, *i.e.*, one side. On reaching the hands of the maker-up the sheets will be cut single and the books collated in sets and overcast. This procedure arises out of the impossibility of making sections with three different colours of paper. If we make up a dummy of the colours named, we shall see that the latter half of the section is inverse to the first half. The same also applies to a quad book of four different colours. A serviceable quadruple book of manifold, cream, pink and cream, can, however, be made up in section form by putting ten sheets and one pink paste-in in the first section, and nine sheets and one pink paste-in in the second section. In this, as in the duplicate example given, the outside sheet of the first section forms the first leaf of the second section.

One might go on writing page after page on this somewhat intricate but very interesting subject, but I shall

content myself by giving a review of dummy-making generally :—

1.—A dummy is made up for the purpose of ascertaining the positions of the various page patterns required upon the flat sheet being ruled.

2.—The requirements of the customer must be thoroughly understood before proceeding to make up a dummy.

3.—The quantity of sheets per section must be determined according to the quality of paper being used and the quantity of pages or openings ordered.

4.—Make up the dummy on the quality of paper being used for the job if possible ; about 3 ins. by 5 ins. fly will be found the most suitable size in the majority of cases.

5.—If on hand-made paper, reverse every other sheet, so that when folded the openings will fall blue and white alternately.

6.—In numbering the pages the utmost care must be used, as either the omission or the repetition of a number might throw the whole book wrong.

7.—If more than four pages are being got out of the sheet, the correct imposition of the various page patterns must be found by folding the sheet into the requisite number of pages.

8.—In calculating the quantities of sheets required for book-work, remember the guard-leaf and paste-downs.

9.—When made, the dummy should be kept intact and passed on to the various departments into which the job is destined to go.

ADDENDA.

Although not directly connected with the making of a dummy, but still a kind of dissection, it would be well to state under this heading that in the event of having a complete copy of a set of pages submitted for guidance, care should be taken to number them in the order they appear when received before releasing them ; they can then be easily replaced, and without confusion.

CHAPTER III.

POSIT.

POSITION," or "marking-off," is a subject which deserves much study, and, more than that, demands it. So many jobs come into the hands of the ruler to-day which, if not worked in the proper position—for the printer, folder, or binder to follow—will cause unnecessary labour and add to the cost.

By the word "position," or to be really correct "posit," we mean the ruling of the pattern. If it be for a book it should be in such a position as to allow clear space in the back for the binding margin, and sufficient room all round according to the size ordered for trimming, and for numbering also should the book require it; if an index, or, as some term it, "indice," the placing of the columns in such an order as to give space for the thumb gouge, or gouges also if it be vowelled; if a card, the working of it to the correct edges so as to entail the least number of cuts when it comes to be finally trimmed; if a printed job, the arrangement of the ruling matter in such a manner that will occasion the printer the least trouble and expense.

Let us deal first with the much-heard-of index card—ruled differently on either side, reversible, or, as some term it, "head to tail," and punched at top with a $\frac{1}{4}$ in. tab. The sizes, of course, vary according to requirements, but we will assume this one to be $4\frac{1}{2}$ ins. by 7 ins. Some particulars relative to cards and their sizes will be found at the end of this chapter. The most convenient size in which to work a card of this description would be in a sheet of $9\frac{1}{2}$ ins. by 24 ins. (which is two out of a

royal board, viz., 20 ins. by 25 ins.), with six sides to view arranged front and back—one above the other, repeated side by side. Assuming that the sheet be trimmed all round before being passed on to the ruler, the patterns of either side should be set to the two outside edges, leaving the spare $\frac{1}{2}$ in. in the centre for trimming. After having ruled the first side the card should be turned over and fed in again by the opposite broadest edge; by this method the front and back will appear in their proper position when cut single. Should the back be required to appear the same way up as the front, *i.e.*, not reversible, a similar method is adopted, excepting that the heads of each side be set to appear in the centre.

The reason for advocating the setting to the two outside edges is a threefold one. Firstly, because these two edges are already trimmed flat, that is, without bevel—for there must not be any bevel on either of the edges of an index card; secondly, a final trim of these two edges is saved by this system; and thirdly, on account of its leaving ample room for tab cutting, namely, not less than $\frac{1}{8}$ in. The reason the front and back are worked to view is because one setting only is necessary in ruling, and it is left optional to the compositor whether he imposes in one forme or two for printing, according to the quantity ordered; for if a job is of sufficient quantity to warrant printing it in one forme, viz., $9\frac{1}{2}$ ins. by $7\frac{1}{2}$ ins., one make-ready only is required, and the number of runs (or impressions) reduced by one-half; whereas, were the sheet to be ruled with six fronts on one side and six backs on the other, two settings would be necessary in ruling, whilst the printer also would have to make ready separately for each side, and if the job were being printed two up two stereos of each side would have to be cast. This is a technical point which calls for much study on the part of the ruler, for there are many jobs, other than cards, which can be worked with advantage

to the ruler, even if it be known that the printing of them will be in single sheet.

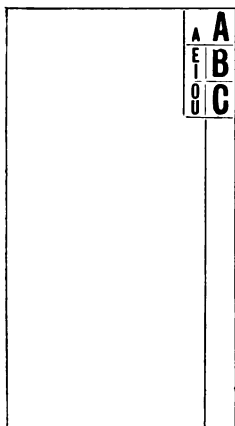
For the next example we will take the index (or indice). In the majority of cases indexes are ruled with feints only, but in some instances down-columns are required on them, whilst others are printed also. But it is with the down-lined index we propose to deal, and we will take one of 11 ins. by 9 ins., *i.e.*, medium 4to, with each page divided into eleven columns—the first two, for the reception of the name and address of the customer, to be $2\frac{1}{2}$ ins. wide each, the remaining nine, for the insertion of the page reference number, to be $\frac{3}{8}$ in. each in width. It may be safely taken that in books of foolscap up to super-royal, $\frac{1}{2}$ in. is necessary for thumb gouge, so that in the marking-off of the left-hand page of this index the first line should appear $\frac{1}{8}$ in. from the back or fold, and the remaining nine lines $\frac{3}{8}$ in. away from each other towards the left edge of the page. This, it will be seen, takes up $3\frac{1}{2}$ ins. space. The next line should be placed $2\frac{1}{2}$ ins. away, leaving a space of 3 ins. on the extreme left of the page; $2\frac{1}{2}$ ins. of this space is required for the writing of the name, the remaining $\frac{1}{2}$ in. being the allowance for thumb gouge. Although the same pattern appears upon the right-hand page, the repeating of it, by reason of the thumb gouge appearing on the extreme right edge of the page, differs from that of the left; and whereas on the left-hand we commenced by putting a line $\frac{3}{8}$ in. from the back or fold, it is only necessary in the case of this page to allow the $\frac{1}{8}$ in., which is a binding margin, and place the first line $2\frac{1}{2}$ ins. away from the fold plus the $\frac{1}{8}$ in. already referred to, or to be more precise, to place the first line $2\frac{5}{8}$ ins. away from the back, the next line to be placed $2\frac{1}{2}$ ins. away from the first, followed by eight more $\frac{3}{8}$ in. away from each other. This, it will be seen, takes up $8\frac{1}{2}$ ins. of the space of the right-hand page, leaving $\frac{1}{2}$ in. for the thumb gouge.

The space to be allowed for thumb gouge varies, of course,

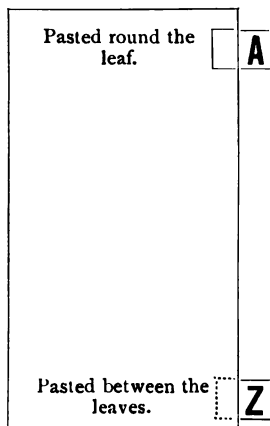
in very large or very small books, but it must be borne in mind that in all cases of gouge indexing the pattern must be set to permit of the cutting of it, and the setting must be calculated from the back in the case of both left and right-hand pages, to the size to which the book will be cut, and not to the edge of the paper; thus, in foolscap the standard breadth is 8 ins.; in demy it is $9\frac{1}{2}$ ins.; in medium, $10\frac{1}{4}$ ins.; in royal, $11\frac{1}{2}$ ins., and so on, whilst the paper would probably be $\frac{3}{8}$ in., or more, or less, broader in all cases.

Regarding vowelled indexes, a class of index which is usually loose and bound limp, or in separate book form indexed throughout, another $\frac{1}{4}$ in. will be required for the cutting of the thumb gouge to the vowels, providing they are cut down the fore-edge; if, however, it is desirable to cut the vowelling across the page, about $1\frac{1}{4}$ ins. will be required. Both of these extra allowances would be in addition to the $\frac{1}{2}$ in. already necessary for the cutting of the consonantal gouge, the columns being contracted accordingly. See sketches:—

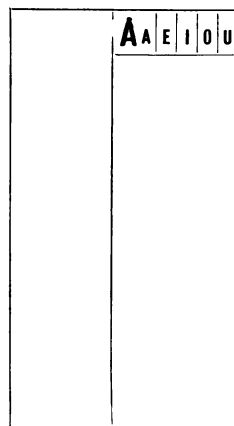
DOWN THE FORE-EDGE.



TABBED INDEX.



ACROSS THE PAGE.



In cases of "tabbed indexes," if the tab is to be pasted round the leaf, the same amount of space is required as for the thumb gouge, viz., $\frac{1}{2}$ in. If fastened between the leaves,

the full breadth of the standard size of the page, unless ordered to be a special size, may be utilized by the ruler, the tab being fastened between two pages which are pasted together to form a thick leaf. The paste-ups will, of course, have to be allowed for.

Let us now take the "splicing of books," etc. The utterance of the term "to splice" instinctively calls to mind the intertwining of ropes, or the joint between two pieces of timber, and it is not so widely known as it should be that paper can be spliced with results as satisfactory to the stationer as the knitting together of ropes to the sailor, or the joining of timber to the carpenter, although, at the same time, it is a system of binding which is adopted as a last resort; it is, in fact, the modern equivalent to whip-stitching, or "the overcast," and is fast superseding this system. Its superiority is claimed on the ground that it gives greater freedom to the book in opening, and consequently a longer life, whilst it is more advantageous also to the handling. It is to some extent a source of inconvenience, but owing to the unusually large sizes asked for, it cannot be expected that one has a stock of paper in the quality desired (which is often a hand-made or first quality azure laid) that will cut to fold.

As an illustration, we will suppose that we have an order for a double royal broad folio allocation book of 100 openings on hand-made paper and full bound. Although books of this kind are used by large institutions, there is not a great demand for them. A double royal broad folio book, it must be understood, denotes that the page is to be the equivalent of royal in size, that is, 23 ins. by $18\frac{1}{2}$ ins., and the opening that of double royal, or 23 ins. by 36 ins. Thus it will be seen that to rule so as to fold section-wise it would have to be worked in double royal. This size, however, is not stocked in hand-made quality, therefore a royal, viz., 24 ins. by 19 ins., is given out; this, when trimmed prior to being put upon the machine for ruling, would be reduced both in breadth and depth

by about $\frac{3}{8}$ in., making the size $23\frac{5}{8}$ ins. by $18\frac{5}{8}$ ins. The quantity of paper required is 102 sheets, and to this must be added the overs allowance, for it must be thoroughly understood that in spliced work each individual sheet must be counted, not as a sheet, but as a leaf, for such it really is, and a leaf is the equivalent in calculation to an opening. The two extra sheets are for paste-downs to the book. The overs allowance depends very largely upon the nature of the job; still, one might take 12 sheets as a basis if it were ruled only, and 18 sheets if it be printed also. Should there be an index included, it would be in addition to the quantity necessary for the book. Having proceeded thus far, it must next be seen that the whole of the paper is face up (that is, the blue side on the top), and then one-half, or 60 sheets (I am assuming this job to be printed) must be counted off and reversed, so as to bring one-half of the paper white side up and the other half blue side up. This procedure is much the same as in the reversion of sheets for a dummy. It is a most important item in both instances, and cannot be too quickly committed to memory, for to omit to carry it out would mean that when bound the left-hand pages would be of one shade, and the right-hand pages of the other. Were, however, the whole of the pages to be of one pattern, this reversion would be unnecessary; but this is a book of openings, and the definition "opening" signifies a difference between the two page-patterns comprising it. Next comes the marking-off, and it is always the safest policy to commence with the heaviest page, that is, the page bearing the greatest number of down-lines, which page in this class of work is usually the right-hand one. (By the way, I am not going into detail regarding cross-lining, for providing sufficient room is left at the head and tail for trimming and paging, it will be correct.) So we will take the right-hand page, and as in the case of an index, begin from what will become, when spliced, the binding edge, *i.e.*, the left. For the splicing of books of this size $\frac{3}{8}$ in. is required for the

lap-over, or guard, for the splicing of a book really means the guarding of one leaf to the extent of $\frac{3}{16}$ in. round the other, a corresponding measurement having previously been cut away from the sheet round which the guard is being put, thus allowing the fore-edges to fold level with each other. It will now be seen that this space of $\frac{3}{16}$ in. must be reckoned practically as dead-distance, and to this must be given $\frac{1}{4}$ in. for binding margin, for books of this description must always be made to open freely, even at the expense of contracting the columns to permit of it; so that $\frac{7}{16}$ in. from the left edge of the sheet the first double line will appear, and from this line the right-hand page pattern will be marked, working to the right edge of the sheet, and allowing $\frac{1}{8}$ in. at this edge for the trimming of the fore-edge when the book is sewn. It is most essential, if good work is to accrue, that the binding line—that is, the line $\frac{7}{16}$ in. from the edge of the sheet—be at perfect right angles with the head-line, and that the corresponding line which will be put on the other side of the sheet is seen to register with it. It will be remembered that we have dealt only with the right-hand page pattern. This page pattern must be ruled upon the whole of the first side of the paper, consisting of 120 sheets blue and white sides alternately. For the left-hand page-pattern the whole of the sheets must be turned over, and this pattern must be ruled upon the other side of the sheets, commencing the first, or binding line, $\frac{7}{16}$ in. from the right-hand edge of the sheet, and working up to $\frac{1}{8}$ in. of the left edge. Briefly it might be specified as “one pattern one side, the other pattern the other side.”

Upon this same principle of “position” the loose-leaf ledger is ruled, excepting that much more space is allowed from the edge of the sheet to the marginal double. On the sample sheet which I have before me—which, by the way, is one of the much-advertised “Dade Perpetual Ledger”—a margin of $2\frac{7}{16}$ ins. is allowed, $\frac{1}{8}$ in. of which is taken up by the punched holes, then a space of $\frac{5}{16}$ in. followed by nine scored impressions

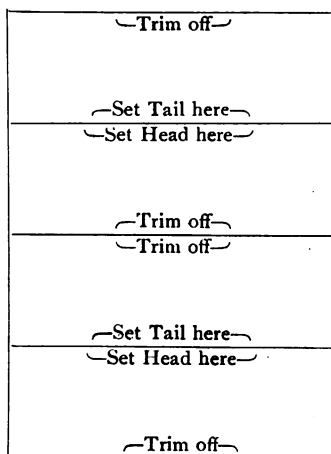
of $\frac{1}{8}$ in. each, another space of $\frac{5}{16}$ in., then the marginal double. This, at first sight, may seem somewhat excessive, but a slight acquaintance with the leaves when inserted in the patent case will reveal that this is not an atom too much to permit of freedom in opening.

Another example of "position" in which the allowance of margin plays a prominent part is the "pattern guard standard." Let us take one generally used by the tailor for the reception of samples of clothing material and assume it to be one of medium reduced to 21 ins. by 17 ins. This book is much the same as, but stronger than, the ordinary photo album, excepting that on each side of the board is pasted a sheet of ruled cartridge, the pattern to be arranged so as to allow six sections of $5\frac{1}{2}$ ins. by $4\frac{1}{2}$ ins. each, with a margin of $1\frac{1}{4}$ ins. at head and $1\frac{1}{4}$ ins. at fore-edge, and a box column of 1 in. at the top of each section for numbering the sample, and $\frac{1}{2}$ in. margin between each section for convenience in handling the sample after it has been fixed in, and margins of $\frac{3}{4}$ in. each at the back and tail. The cartridge sheet, on account of being pasted on to the board, would be ruled on one side only, and as regards cross-lining, no difficulty would be experienced; but in down-lining the fore-edge and back margins have to be reckoned with, and this means that one-half of the paper, according to the quantity of leaves ordered in the book, would have to be ruled with the $1\frac{1}{4}$ in. margin on the right-hand edge of the sheet, and $\frac{3}{4}$ in. on the left, and the other half would be reversed so as to bring the $1\frac{1}{4}$ in. margin on the left edge and the $\frac{3}{4}$ in. on the right. The first-named position is for that portion which is to make the right-hand pages, and the latter for the left-hand pages. The quantity of cartridge sheets required would be double that of the quantity of leaves ordered for the book, because in this class of work two sheets constitute one leaf, *i.e.*, a sheet to each side of the board. Should the error of ruling the whole of the paper to either of these individual positions occur, it can be remedied by ruling

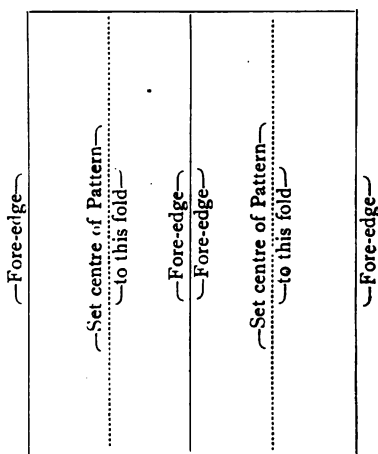
the second side of one-half of the paper in exact alignment with the first side.

To further illustrate this subject of "position" let us take the 16-page foolscap 8vo memo. book, ruled feints and common, covered with tinted paper and stitched with two wires, the quality of the paper to be an E.S. (Engine-Sized) Writing, and the quantity ordered to be sufficiently large to allow of its being worked in either quad or double foolscap. We will, however, suppose double cap to be the most convenient size for working in this case, and we will reckon with cross-

FOR CROSS-LINING.



FOR DOWN-LINING.



lining first. Fold the sheet into four quarters of $6\frac{1}{2}$ ins. by $16\frac{1}{2}$ ins. each (or thereabouts, according to the size of the sheet), and mark off flush from the two folds, that is, in the first division of $6\frac{1}{2}$ ins. place the tail of the pattern to the fold; in the second division of $6\frac{1}{2}$ ins. place the head of the pattern to this same fold and mark off thus. This process to be repeated on the bottom half of the double cap sheet. This system, it will be seen, saves a trim when the books are made up, inasmuch as the tail and head of the first and second divisions respectively are trimmed by the cut which reduces them to foolscap 8vo. (I am assuming that the books would

be ruled, covered, and wire-stitched before this cut was made.) There is, of course, a tendency to bevel the "off" edge by this method, but it is not noticeable when handling the books individually, and, as already stated, it saves a trim, and that is why it is adopted. In down-lining, *i.e.*, ruling the cash columns, the sheet must be folded into four quarters of 27 ins. by $4\frac{1}{2}$ ins., and the pattern marked off to the first and second folds. For example, see previous page.

In "scribbling," and, in fact, in "pad" work generally, a similar method is adopted regarding "position," viz., setting flush to the head and folds.

Thus, if we have an order for 150 royal 9mo oblong pads of 200 leaves each, ruled feints with 1 in. margin at head and covered to tear off with marbled paper, the sheet would be folded into three equal divisions, and the first feint line should appear 1 in. from the top or head of the first division, and 1 in. from each of the two succeeding folds. I am assuming, of course, that royal would be used, although in many instances of "pad" work a job lot is used; still, this system should be brought into practice whenever possible. Should the pad be perforated and wire-stitched, $1\frac{1}{2}$ ins. should be given as margin at the head in the case of each of the divisions to allow for the binding margin. The binding margin in tear-out work is an important factor. In sewn work $\frac{3}{8}$ in. is a fair allowance, and in some instances $\frac{1}{4}$ in. is enough; but in stabbed, overcast and wire-stitched jobs not less than $\frac{1}{2}$ in. should be allowed, the ruling matter being either contracted or carried nearer to the edge of the sheet to allow for the requisite space.

In manifold or duplicate books "position" is an item of the utmost importance. This class of work is usually most intricate; in fact, much care must be bestowed upon it by everyone through whose hands it may have to pass. Most ailments, however, have a remedy, and in this case the trouble may be greatly minimised by colouring, before commencing to rule, the head, or lay-edge for cross-lining, towards

the left, and the left, or lay-edge for down-lining, if down lines are required to be put upon it. (In the down-lining of manifold paper it must be remembered that the left-hand page-pattern is reversed, that is, the "date" line is set from the back or fold, and the "pence" column at the left edge, or fore-edge.) Then, if a correct register of the two leaves be maintained by the marked edges, the maker-up should not experience much difficulty; at the same time, a great deal depends upon squareness in the cutting of the paper. This problem of "register" is a deep one, and it is of vital importance for the guidance of those in the other departments through which the work may have to go that the lay edges be marked by the ruler, and in all cases where the sheet has to be cut to a smaller size than that which it has been ruled, either for printing or making up, the edges of what, when cut, will become the different lots must be marked or coloured in such a manner as to make it easy to distinguish one from the other, so as to avoid these cuts becoming mixed. Any variation can then be dealt with in a practical manner without trouble being caused or time being spent in sorting, as in cases where a mixing of the cuts has occurred.

Memorandum and bill-head work is a class of the trade in which "position" counts largely in the matter of economical production, and whilst the ruler should always aim at the cheapest possible means of working off a job efficiently, it should at the same time be borne in mind that the printer or lithographer must be considered, and in some instances it is better to occasion a little more time and expense in ruling than to adopt the quickest method in this department, which may cause unnecessary labour in the letterpress or lithographic departments.

With letterpress work generally it may be safely taken that if the sheet be folded into the requisite number of divisions according to the sizes ordered, and the pattern set to allow a final trim all round of each division, that the position will

be correct. Should, however, the job be printed upon both sides of the sheet, the question will arise as to whether it will be cheaper to rule fronts and backs to view, or fronts only, and the issue will depend mainly upon the amount of work in the heading, quantity of the order, and equipment of machinery.

In litho work, although there are many points to be constantly kept in mind, one can at the same time speak with more certainty. For instance, it may be regarded as definite that the lithographer will require the broadest edge for the purpose of cylinder grip, and to this end a clear $\frac{1}{2}$ in. of space must be allowed from any printed matter to the edge of the sheet; more especially is this noticeable in the cases of headings which require to have a footnote printed in. Further, memorandum and all straight running ruled work should be worked head to head. This position does not necessitate any extra labour on the part of the ruler, whilst making it optional to the plate preparer to use a small stone. In orders where the same heading is to be put upon different sizes of paper, say, for instance, foolscap folio (13 ins. by 8 ins.), large post 4to (10 ins. by 8 ins.), and large post 6mo ($6\frac{3}{4}$ ins. by 8 ins.), the head to head position should always be adopted, unless, of course, the quantities are too small to permit of their being worked other than two on. It will be seen that this "position" necessitates the employment of two carriages in down-lined work, but this extra labour in ruling is easily outweighed by the advantages gained in the lithographing department, inasmuch as one stone only need be prepared for the whole of the head to head portion, an alteration of the lay being all that is necessary to the working-off of the different sized sheets, whilst the bottom portion of the 6mo sheet, which appears two on, may be cut off and worked separately, the two transfers not required being polished off, or two extra transfers for printing the bottom portion may be put upon the stone prior to the working of the 6mo sheet.

The actual process of "marking-off" differs greatly, some men adopting one style and some another. I, personally, prefer the method of pricking the pattern, and feel sure it will commend itself to all pen workers in heavy pattern down-lining where one has simply to follow the copy. In detail, it is this :—Get the correct centres both of the pattern and a sheet of the job to be ruled by folding together the two outside edges, as in the making of a fly sheet. Lay them centre to centre upon the feeding board, with the headlines in perfect register, pattern on the top, hold them together firmly with the left hand, then with a stoutish pin in the right hand prick through the lines on the pattern. In the case of double lines it is advisable to make two pin marks so as to be discernible from singles. When the pattern is lifted off it will be seen (providing that neither of the sheets have been allowed to move) that a correct impression of the copy has been produced upon the sheet. For the sake of easily distinguishing the lines when in the machine they should be lightly touched with the fine point of a pencil. This system of line pricking will also be found very effective in ascertaining whether a correct register is being kept upon stout papers. In semi-transparent papers the system of "shining," *i.e.*, holding the sheet up to the light, is perhaps the best and most speedy method known. The definition of the word "register" is—that one or more lines upon one side of the paper be identical with one or more upon the other side.

CHAPTER IV.

INDEX CARDS.

BY R. WRAGG.

IT seems very apparent that the Card Index system of keeping business accounts has come to stay, so we will deal with it from the point of view of an established fact rather than with its merits and adaptabilities to business.

The material from which these cards are cut is termed "index board," and it is made in varying thicknesses and grades, and usually stocked in four tints.

Most common amongst the grades in daily use are the "♦ Index Bristol Boards," "Rope Bristols," the "Fileaway," and the "Flexible," and they are made in royal, 20 ins. by 25 ins., imperial, 22 ins. by 30 ins., and a special size manufactured for convenience and economy in cutting, viz., 25½ ins. by 30½ ins.

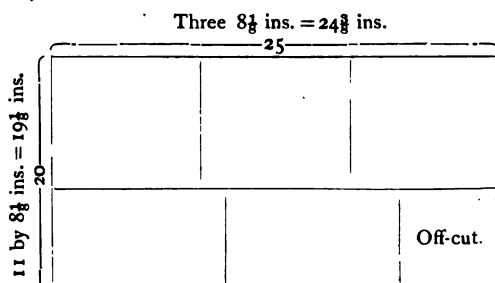
It is very necessary that these sizes be committed to memory, for one of the chief factors connected with the manufacture of index cards, so far as the ruler is concerned, is the knowledge of how to cut the material to the best advantage.

Let us suppose that we have to work 2,000 cards which are to be 5 ins. by 8 ins., printed on both sides and tabbed in five positions.

Firstly, space must be reckoned to permit of the cutting of the tab, and secondly, twice the depth must be allowed for the working of two set, *i.e.*, front and back, in printing, whilst trimming space must also be allowed; thus, instead of calculating to cut 5 ins. by 8 ins., we must double the

depth and allow a trifle more in breadth, say, $\frac{1}{8}$ in., for trimming, thus 11 ins. by $8\frac{1}{8}$ ins.

It would seem at first glance that this size would cut four out of a royal board, but experience teaches us that five can be got out, thus :—



which means a saving of 20 per cent. in material.

Here is a sure way of judging whether you can manipulate as shown. If the two sizes, that is, both breadth and depth of the card in question, when added together total less than the width of the board, it is probable that you can work to advantage. For example see sketch.

Another conclusive rule is that when a card is required in which there is very little difference in the sizes of breadth and depth, it is useless to consider manipulation, because they are practically square. For instance, a card of $5\frac{1}{4}$ ins. by $4\frac{3}{4}$ ins., or one of $6\frac{1}{2}$ ins. by 7 ins.

CHAPTER V.

INKS.

THE mixing and preparation of inks to the proper consistency depends very largely upon the make or class of paper for which they are to be used, and a brief survey of the ingredients which are made use of in the manufacture of paper reveals to us that this is a branch of industry in which the law of affinity is made manifest.

“Affinity,” says the Rev. Thos. Davidson in Chambers’ Dictionary, “is the peculiar attraction between the atoms of two simple substances which make them combine to form a compound.”

For instance, the mason uses a compound product of the earth, namely, cement, to aid him in uniting together two blocks of stone; the moulder fashions the molten metal in a bed prepared of compound, *i.e.*, loam, the chief elements of which are minerals; the sailor smears the timbers of a ship with tar, a product of the pine forest, that he may preserve them; whilst we rulers, in our efforts to get a solid line with a water-colour on a greasy surface, resort to the use of ox-gall, a product of animal secreta, which is soluble in water.

These are a few examples of a common but little understood law, and I quote them in the hope that they may convey to the reader a clearer conception of why ox-gall is so much in evidence with regard to the ruling of paper.

Briefly, one might define the classes of paper common to the ruler as belonging to three grades, viz., E.S. (Engine-sized), T.S. (Tub-sized), Writings and Hand-mades. These three grades of paper, differing as they do in price per pound or

ream, necessarily have varying values in fibres used in their composition, as well as different kinds of sizing to render them suitable for writing upon.

In E.S. papers, which are the cheapest of the three, a mineral size is used. This size is a compound of resin and alum, and it is added in the form of a solution in certain proportions, according to the quality of the paper being made, to the mass of pulp while it is being reduced to fibre in the beating engine; hence the name, "Engine-sized."

In Tub-sized papers, which are of a better class than the former, the fibre used consists to a greater or lesser degree of cotton or linen rag blended according to the selling price with wood or esparto grass. The pulp is prepared on the same principle as before, but the sizing, which is a compound prepared from the bones and skins of animals, and is technically termed "animal size," takes place after the paper is actually made, when the paper in the reel passes through a bath or "tub" of size, being dried afterwards over heated cylinders. Thus it derives its name, "Tub-sized."

In the more expensive of T.S. and Hand-made papers a purer quality of rag is used, and the sizing, which is the animal compound, but of a greater degree of density, is done by hand, each sheet of paper being separately dipped into the tub containing it, and "air-dried" or "loft-dried" by being hung up on lines usually made of hair.

An analysis of ox-gall reveals to us several constituents, chief of which are Glycocholic acid, Lactic acid and Choline. Glycocholic acid is the agent we need as a binding medium, but it is not soluble in water. Lactic acid and Choline, whilst not being of any real value to the ruler, are both soluble in water and akin to the first-named property, and as ruling ink is practically coloured water, it will be seen that we must have these three glycins, although we need but one.

It must not be supposed that ox-gall stands alone pre-eminent as a binding medium, for whilst it is the most suitable

property for the majority of the papers which come into the hands of the ruler, there are some classes of paper upon which the addition to the ink of either gum arabic, soda (washing), or borax produces a much better effect.

It is here that the kindred law reveals itself, for gum, soda and borax are products of either the vegetable or mineral kingdoms, and being soluble in water, will bind a water ink to paper which is composed of products of the vegetable and mineral kingdoms. Ox-gall is a natural compound of animal organic matter, and being soluble in water, will bind it to paper surfaced as it were with another compound of animal organic matter.

Amongst rulers generally there are so many different methods adopted in the preparation of inks for the pen and disc machines, so much variety of opinion as to the fineness or coarseness of lines, so many different degrees of solidity and resisting power of water in the various parts of the world in which paper-ruling is carried on, that I fear it is impossible to arrive at a definite basis upon which to govern the addition of gall, or a substitute, to inks. Rather would I advocate a study on the part of the ruler of the various makes of the paper with which he, or she, has to deal, choosing therefrom the happy medium, which, for instance, in a general commercial shop would be a fine azure laid, *i.e.*, Tub-sized; and when an ink suitable to it has been mixed, its fluidity should be committed to memory by dipping into the basin the thumb and forefinger of the hand and feeling it. After a little practice of this method the sense of touch will become keenly developed, and the addition of gall or the neutralization of its effects, according to the various makes of paper, may be met without fear.

In the case of Banks, Buffs and Glazed Writings and Printings, *i.e.*, Engine-sized, gall may be dispensed with altogether, and a mixture of gum arabic and soda adopted in its stead. Several azure lays, too, are more partial to gum.

soda, or borax than to gall; and there are many azure laid and coarse-surfaced papers which, although workable with gum and soda, are improved considerably by the addition of a little gall. On the contrary, many hand-made papers and some tub-sized papers also, which would be unworkable without gall, give much better results when a little gum is added.

Throughout my chapter on inks I have taken the pen machine as the base for working upon, although what I have said refers equally well to the disc with the exception that in the majority of papers greater fluidity of the inks is required. The reader must not confound the meaning of the word "fluid" with that of "liquid"; what is intended to be conveyed is that for use upon the disc machine more gall, or a substitute for it, must be added, according to the nature of the paper being worked.

Much of the non-success of effort and a great many of the ill-effects attained by so many rulers are almost entirely due to want of knowledge of the mixing and preparation of inks. This is a most important branch of our industry, and one that is worthy of much study and careful thought, and I feel confident, even at the risk of repetition, in asserting that there are no "golden rules" upon which we may with safety rely; each individual operator must learn to judge for himself or herself what is the proper consistency both of colour and fluid for the working of the various classes of paper with which they have to deal.

In cases where a sufficient quantity of ink to last about a fortnight has been prepared in liquid form, or purchased by the gallon, an antiseptic, such as cloves, creosote, or carbolic acid, should be added; either of these three properties will arrest putrefaction. For my part, I prefer to mix from the powder in quantities sufficient for immediate use.

For the ruling of pencil or neutral feints a good non-corrosive black should be used. It must be diluted with water to the strength required, and if a spot or two of

red is put into it, the effect will be much more pleasing to the eye.

Parchment and vellum may be worked with good results by adding a mixture of gum and liquid ammonia to the ink ; care, however, is needed in the use of ammonia, for it has a tendency to take the colour of the ink. There is, also, the method of brushing the surface of parchment with a preparation named " pounce," in which case gall alone will be found sufficient to get a solid line. " Pounce " is a preparation obtainable from a law stationer, and it should be rubbed all over the portion of the skin which requires to be ruled with a hand-pad of cotton wool. This system is not popular on account of the time taken up by the treatment of each individual skin.

A white ink for use upon dark-surfaced papers can be prepared by mixing a good quality white marbling colour in lukewarm water ; gum should be added as a binding medium, and generally a drier, too, is needed.

As a drier, methylated spirits is perhaps the most widely known of volatiles ; but a stronger and more powerful agent can be prepared by mixing together four parts of sulphuric ether and one part of spirits of turpentine. This preparation, like ammonia, has a tendency to kill colour, and should be used sparingly.

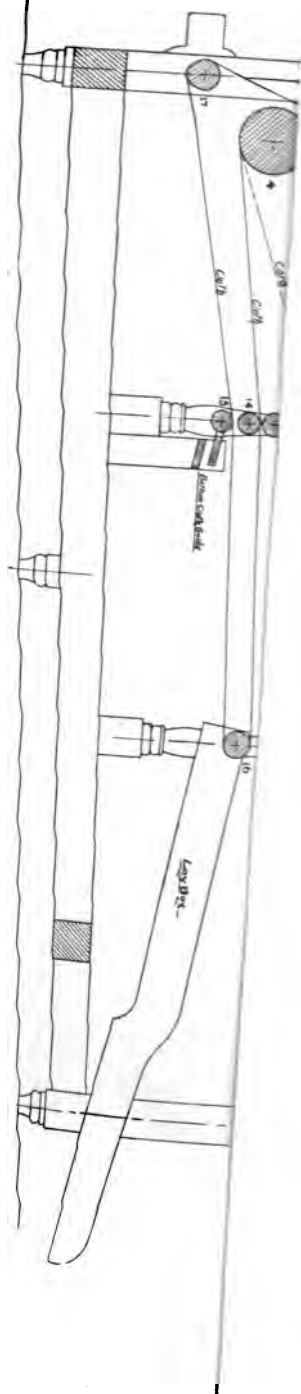
The great problem amongst rulers generally is the preparation of inks that will produce a clear, solid line and not spread. There are, however, some papers upon which water alone will spread, so that it becomes necessary in such cases to add to the ink some property that will have the effect of hardening the water. Rock salt has, in some instances, been resorted to, and what seems more curious still, sea-water ; whilst the property most easily obtainable in the majority of cases is powdered alum.

In those cases in which the too free use of gall is made apparent, a few drops of absolute alcohol will be found to have a neutralizing effect.

Leaving the all-important factor of putting lines upon paper, we will deal with the elimination of them.

Time was when a blot, blind line, or badly-struck pattern had to be scratched out either with a penknife or a piece of sand-paper; but chemical science has since revealed to us two marvellous properties in chloride of lime and oxalic acid, both of which necessitate dissolution from the solid to the liquid form before being of any real value to us as bleachers. Fresh chloride and good acid is, of course, essential, and the dissolving process should be brought about by pouring boiling water over either of them and allowing them to stand until cold, when they should be strained. The actual process of elimination takes place by washing the affected part of the paper with the solution. If allowed to stand for a few moments the colour will be seen to gradually disappear. When perfectly dry, the affected part should be briskly but lightly rubbed with a pad of soft-surfaced paper. This process will both clear the paper of either the lime or the acid and restore a slight gloss to the surface, when it may, if necessary, be neatly repaired.

Chloride of lime may be used with good effect upon hand-made, azure and cream papers, whilst oxalic acid is only really beneficial upon blue paper and with red ink. Its strong forte is its neutral effect upon the colours blue and black. In the case of a red blot upon blue paper, or a feint line feathered with red, its value as an eliminator is great. Some rulers mix the two solutions together, others put a little soda in the lime, claiming that whilst not being injurious, it at the same time takes away much of the fierceness of bleaching power. This latter mixture is a capital aid to the removal of ink stains from the hands and fingers.



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CHAPTER VI.

THE PEN MACHINE.

I DO not propose to go into detail how to set up a ruling machine, for there are so many different styles of machines in use that I fear such a subject would not only take up much valuable space, but would become somewhat uninteresting reading matter. I shall, therefore, deal with the most popular of them all, namely, the double or auxiliary striker, the introduction of which has brought about so much change of operation in the trade from what it was when many of us were first acquainted with it.

Paper-ruling by machinery owes its origin to American skill, although the late Mr. William Dawson, the founder of the firm of Messrs. William Dawson & Sons, of Wharfedale printing machine fame, was the builder of the first British-made ruling machine in or about the year 1845. It was much the same in build as the machines of to-day, excepting that it was used exclusively for run-through work or hand striking, and consequently did not possess any of the accoutrements common to striker machines. Little or no headway was made in the building of ruling machines during the next twenty-five years or so, possibly owing to the fact that Mr. Dawson had in the meantime devoted his energies almost entirely to the building of printing machinery. In the year 1876, however, Mr. John Shaw, the founder of the firm now trading as Messrs. John Shaw & Sons, of Honley, Yorkshire, returned to England from America, and in the following year he built a machine fitted with the cylinder gate-lift for the purpose of automatic striking, and was successful in

disposing of it to a Manchester stationer. Since then improvement has continued until we now have the "auxiliary" and "triple" carriages fitted to machines, upon the working of which I am basing my article.

Let us imagine, then, a striker machine—the one we are accustomed to, for instance. If it be a single striker, do not mind; keep the imaginative picture before you. If a double or treble striker, and fitted with change wheels and instantaneous gate-lifting device, so much the better.

To commence with, we must ask ourselves these questions: "What is a striker machine?" and "In what way does it differ from the feint-liner or hand-striker?" It is necessary that a clear understanding of the qualities of the machine being dealt with should be arrived at before proceeding further, and upon the nature of the answers to these questions will depend very largely the skill of the querist as a tradesman.

To the first question I would say that a striker machine is one constructed in such a manner as to bring about the regular detention of a number of sheets so as to allow of ruling them from one given point to another; and to the second question, that a striker machine differs from the feint-liner inasmuch as in the case of the latter all the journals or bearings of the rollers which serve as carriers to the top blanket are fixtures (see rollers Nos. 1 to 9 in diagram), Nos. 1 and 2 being built just sufficiently high as to keep the cords always tight up to the cloth, whilst in the case of the former the brass rollers Nos. 1 and 2 are built with a portable journal to enable them to be raised or lowered at will, and a gate or sheet-stopper attached. These, then, are the distinctive qualities of the machines, and it follows, therefore, that before accurate striking can be accomplished rollers Nos. 1 and 2 should be thrown out of action by lowering them clear of the cloth, thus reverting to the hand-striker model. The proper plane of the machine in its now primitive form must next be found by adjusting the No. 3 cylinder

and allowing the machine to run (if fitted with power), or turning by hand for a little while until satisfied that the tension of the blanket is normal. The top cords, too, must be fairly tight and all of one strain. The rollers Nos. 1 and 2 may then be raised until they lift the cloth just sufficiently high as to make it touch the cords (an incorrect position of these two rollers is the cause of many mishaps in striking). If it be seen that the blade of the gate is either pressing too deeply into the cloth, or not touching it at all, it may be regulated by releasing the screw which binds the fillip to the gate rod, and moving the fillip either upwards or downwards as required, tightening the screw again when the correct angle has been found. Possibly it will be necessary to lower the blade of the gate so as not to allow it to lift too high, and this may be done by releasing the screw of the casting which strikes the rubber buffer and lowering it a little. This screw also must be tightened when the gate has been altered to the desired position.

Such is the root-principle of automatic striking, which, if followed carefully, cannot fail to give accurate results even in the working of the most delicate of papers. There are, of course, incidents which crop up at various times to render the striking inaccurate, but providing that the first principles have been strictly adhered to, the inaccuracy can generally be traced to some indirect cause. For instance, either one or both of the rollers Nos. 1 and 2, if wooden ones, may be warped, or one or the other of the spindle pins may be bent, in which case they should be remedied; both of these defects are detrimental to good work. If these rollers be composed of brass, they may through constant wear have become caked in parts with a hardened mixture of grease and dust, thereby rendering them much the same as a warped wooden roller. Should this be so, they should be taken out and scraped clean. It may be that the gate blade does not touch the blanket evenly all the way across the machine; or, further, the cords

may be of an uneven tension, *i.e.*, some tight and some slack, with one or more of them running under the teeth of the gate blade. Possibly No. 1 cylinder or one of the cord rollers may be somewhat out of truth. Then, again, the change-wheels may not have been screwed tight enough upon their respective spindles, and the connecting wheel on the radial plate may be either meshed too slack or binding.

These examples are, of course, imaginary causes of an imaginary grievance. Still, they are points which must be borne in mind as likely to produce an erratic effect in striking; and furthermore, in the event of not being able to get a satisfactory result from the machine, one's attention is apt to become taken up by some of the best-known likely causes, to the disregard of others equally likely, but not so well known.

THE FEEDING-BOARD.

Most machines are erected insufficiently equipped so far as the feeding-board is concerned, and it has now come to be regarded as quite in the ordinary state of things for the purchaser of a machine to supply a board upon which to feed the sheets into the machine, and for this purpose a millboard about 20 ins. by 30 ins. has been almost universally adopted. This, however, is very sensitive to the atmosphere, and gives trouble at times by curling slightly at the ends, thereby rendering good feeding impossible; so to combat this evil, a sheet of zinc, cut squarely upon all four edges, and flanged on the outer edge, at perfect right angles to the guide edge, and with a projection of about an inch, should be used. It should be placed flange downwards, so as to move along the edge of the feeding-board proper, when the guide may be quickly and more truly adjusted by bringing it up to the edge of the zinc sheet.

THE BLANKETS.

The blankets, or cloths, are fitted to the machine for the purpose of carrying the sheet both before and after the process

of ruling, and great care of them is necessary, both as regards cleanliness of surface and tension. With the top blanket, more so than the bottom, cleanliness is certainly a virtue, and whilst it is impossible to avoid wholly the absorption of ink by the blanket, it is, at the same time, necessary to adopt every measure that is likely to reduce absorption to a minimum, and to this end a good-sized sheet of oil-paper should always be placed upon the blanket during the process of flannelling, and also when the frame is being stripped of the ink-feeding material. The old-fashioned method of drying the pens upon the cloth after use should be discarded, and, in fact, the pens, when flannelled, should not be allowed to come into contact with the cloth any more than is absolutely necessary. In the event of striking a good number of understops from various heads in one slide, it is advisable to set the cam so that the topmost of the pens lift on the extreme edge of the paper, thus saving as far as possible any unnecessary wetting of the blanket. (I am assuming that the striking is from the head.)

To those who are familiar with the old style of hand machine, the purpose of the addition upon the later makes of the cloth-guide roller will reveal itself; but for the benefit of those who have not had experience upon other than striker machines a word or two of explanation will, no doubt, be appreciated. Previous to the introduction of these cloth-guide rollers (one of which appears underneath both the top and bottom blankets), much difficulty and a great loss of time was caused by the roving of the blanket first to one side of the machine and then to the other. Many remedies were tried without lasting success, until Mr. John Shaw, in or about the year 1880, fitted to a machine a roller fixed in a frame which swung freely on a centre pin instead of being set in bearings on either side of the machine, and to this frame on either side of the machine a portable wire arm was attached so as to just touch the cloth without causing it to pucker.

The weight of the cloth running against the arm caused it to veer over and turn the roller in a transverse direction, and this transverse action solved the difficulty and gave to us a straight-running cloth.

THE WASHING OF BLANKETS.

The washing of the blanket is somewhat trying to rulers generally, and it is indeed difficult. The machine-makers advocate that the blanket be taken off and sent to a laundryman for the purpose of cleaning, and to some extent I am inclined to agree with them. Still, there are many craftsmen who are far more adept in the washing of blankets than the laundryman, for whilst this person may restore it to a colour more nearly approaching its original whiteness than the former, he may, at the same time, resort to the use of chloride of lime or soap for this purpose, both of which are resistants to ink. Should it be deemed advisable to send the blanket to a skilled cleaner, a request that he will use nothing likely to be detrimental to ruling should accompany it. Should the ruler prefer to wash it himself, he must first strip the machine of all parts likely to become affected by wet, viz., the gate, the carriages and standards, the cords, the ink-box, and all blotting paper should be removed from the rollers. Then procure a bucket three parts filled with lukewarm water, add liquid ammonia freely, and wash with a soft brush or cloth until satisfied that it is clean all the way round. The tension should occasionally be relieved during the process so as not to unduly stretch the blanket, and if possible the machine should be kept running whilst it is being dried.

THE CORDS.

These, like the blankets, appear both over and under the pen-board, and whilst the last-named, or bottom cords, are simply for the purpose of carrying the sheet exposed to the air to the bottom blanket, which in its turn delivers it to the

lay-boy, the over, or top cords, are for the purpose of keeping the sheet of paper straight and flat upon the top blanket during the process of ruling. For the top cords a strong but not too thick thread should be used, and the knot must be as small as possible to avoid mounting the grooved roller. The machine-makers supply a good thread on the reel for this purpose; to those, however, who obtain their supplies from the binding shop, No. 25 three-cord sewing thread will be found suitable. For the bottom cords a much stronger thread is necessary on account of it being the main support of the sheet in its transit from the top to the bottom blanket. Before commencing to cord the machine, it should be seen that the tension rollers, *i.e.*, the one at the top marked 000, and No. 19 at the foot, are midway between the thumb-screws on either side of the frame; the cords may then be tightened or slackened according to the quality of paper being worked. I do not propose to go into details of the various methods of tying the cords which are practised by different men, but will content myself by trying to demonstrate the system which I have found the most reliable. For the making of a top cord pass the thread both under and over No. 1 cylinder and the rollers marked 00, 000, and 0, make a single loop round the loose end as it hangs from roller 0, cut from the spool the required quantity of thread, then put the cut end through the loop, pull the two ends to the required tension and keep them from slipping away by binding the now tightened loop between the thumb and forefinger of the left hand; then with the right hand make a loop with the cut end round the cord above the tightened loop and draw tight. In order to add strength to the cord another similar

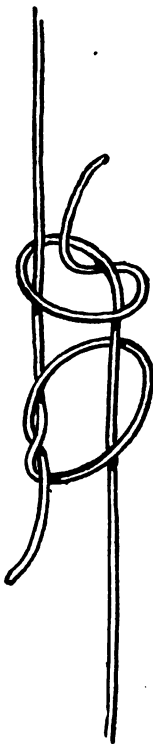


DIAGRAM OF THE
FASTENING OF
A CORD.

knot should be tied, and the ends of thread cut away as close as possible. It is most essential that each cord should be pulled to the same strain before being finally fastened, and it is always the best policy to work from the left and right-hand sides alternately to the centre.

Although the machine shown in the sketch is of a late pattern, it is not one of the very latest. Machines are now being built to allow either the top or bottom blankets to run independently of each other, and the tape-wheels of the lay-boy work by means of pulleys of different sizes, a half-speed faster than the bottom blanket, thereby reducing the chances of sheets overlapping during distribution. This independence of working of the two parts of the machine is brought about by the introduction of a small brass roller, similar to Nos. 1 and 2, which is fitted in bearings fixed to either side of the machine just level with the top of, and about $\frac{1}{2}$ in. away from, the No. 4 cylinder, around which the cords run, instead of pursuing their course round the cylinder as shown in sketch. It greatly facilitates hand-striking, inasmuch as that whilst the top portion of the machine is being turned by hand, the bottom portion may be driven by power. This advantage is, of course, lost in the case of hand-driven machines. Whilst much can be said in favour of this pattern of machine, it is, at the same time, often detrimental to the working of thin papers on account of the tendency they have when damp to curl round the No. 4 cylinder. This grievance can, however, be largely remedied by passing one or two of the bottom cords round the No. 4 cylinder instead of round the brass roller as previously described, and allowing them to run along the bottom carrier rollers, as is the case with the remainder of the cords. This is practically a reversion to the old style of make, but providing that not too many cords are run round the cylinder, the blankets will still run independently of each other. Some trouble is also experienced at times in the

transit of thin papers from the blanket to the paper-curling guides, on account of the gap between these two parts. It may be remedied by curling the top and bottom corners of the front edges of the sheets upwards a little prior to their being fed into the machine (care must be taken not to overdo it, or it will impede the feeding process). If this does not answer the purpose, take out No. 14 roller and run the bottom blanket as slack as possible by releasing No. 17 roller. This will cause a dip in the centre of the blanket and give a gradual rise up to No. 16 roller, thus allowing the air to get between the sheet and the blanket. Even with these precautions it is possible that the wooden runner which is placed between the two guides may catch the sheet and double it up; so it should be taken out and substituted by a piece of strawboard flanged and fastened to the frame of the lay-boy with a tin tack.

It will be seen by the sketch that the top blanket is arranged by means of an alteration of the position of the rollers, to give what is termed an "endless cloth." This device is fitted for the purpose of preventing the sheets clinging to the cloth; but even now it is necessary at times to have a blanket cord running to further ensure the prevention of clinging. This cord may be put on by sticking a pin through the blanket between roller No. 7 and cylinder No. 3 and firmly attaching a cord to it. Set the machine in motion until the pin, drawing the cord with it, has gone round the machine once and returned to the starting point, then stop the machine, cut the thread to the desired length, draw the loose end clear of No. 8 roller, pass it under No. 9, round No. 3, and tie it. To ensure the straight running of this cord a bent pin should be stuck into the stretcher, *i.e.*, that part of the frame upon which the cloth-guide roller spins, and the cord allowed to run in the loop of the pin. In machines which do not possess an "endless cloth" this cord is a necessity, and a small grooved wheel fixed on a stretcher to slide from

side to side of the machine is provided for the purpose of preventing the cord running in a zigzag manner. This cord should be run in the centre of the sheet so far as is possible, for it has a great tendency to skew the sheet at the edge nearest which it is running. For the convenience of ruling stout boards, from the top blanket to the carrier cords—*i.e.*, bottom cords—one, two, or more cords, according to the size of the board being ruled, should be attached in the following manner:—Place a cord over No. 20 grooved roller, round No. 00 tension roller, over No. 3 cylinder, round No. 19 tension roller, and tie the two ends between rollers Nos. 19 and 20.

THE COMPONENT PARTS.

The definition of the word “component” is “making-up,” “forming one of the elements of a compound,” so that in referring to the component parts of a pen machine I mean all those parts which go together to form the whole of each individual section of the machine. For instance, there are the component parts of the power attachment, and the gate and striker attachment, and the standards and carriages. The journals of the cylinders and rollers and their bearings, the driving straps and tape-wheels, are all component parts which go together to form the locomotive section, and all of these will at some time or other require attention.

With the power attachment it is necessary that the driving belts be kept in proper condition for driving by periodical applications of belt paste. The pulleys should be taken off every few days and the journal cleaned, and a liberal supply of new oil put into the bearing before putting on the pulley. Care should be used in putting the collar on to the spindle shank to get the flat side to the pulley; this will enable it to fit without either binding the pulley or allowing it too much play. The clutch slide and cog-wheels should be kept well supplied with oil, and not allowed to clog, for there is a great

deal of friction on these parts. Black-lead has been advocated as a substitute for oil on the cog-wheels, and whilst it answers the purpose admirably, it has not become popular on account of the noise caused by the wheels when in motion.

The gate and striker attachment need careful usage and adjustment, and it must be seen that none of the parts of this particular section of the machine run dry and bind. The large connecting wheel on the radial plate, when fixed to the change-wheels for striking, should never be allowed to bind; at the same time, it should not have too much play. A binding of the cog-wheels will cause constant vibration to the machine when running, whilst if too much freedom be given them the striking will be of a very erratic kind. The change-wheels themselves must be fastened firmly on their respective spindles by means of the brass-winged nut provided for the purpose, and to do this it is necessary to tap the wings gently with a light hammer. The gate blade should be adjusted so as to just touch the cloth all the way along when the fillip is brought into contact with the rotary cam by either raising or lowering the fillip, or moving the gate itself either nearer to, or further away from, the rotary cam, as occasion requires; but it must be clearly understood that when a movement of the gate either backward or forward is necessary, the movement must take place on both sides of the machine, otherwise it will not be square with the guide on the feeding-board. If the distance between the gate when the fillip is released and the cloth be too great, or too small, it may be adjusted by altering the position on the gate rod of the red casting which strikes the rubber buffer.

The rotary cam should be kept steeped, as it were, in oil, whilst all the various bearings about the machine must be looked to at least once a week to see that they do not run dry.

The blotting rollers should be cleaned and the blotting paper renewed as is expedient with the amount of work done by the machine, and it should be noted that those rollers

which come into contact with the driving strap of the bottom blanket are running in the proper direction.

Prior to the setting in order of the pen slide carriages and their standards, the plane of the machine should be taken by means of a spirit-level—that is, by placing upon the pen-board a spirit-level with the ends pointing to either side of the machine; and if it be seen that there is a decided leaning either to one side or the other, the feet of the machine should be packed until a flat surface has been attained. The carriages, each containing a slide, may next be fitted to their respective bearings, and a pen bent to the desired angle should be placed at each end of the slide and in both carriages. The correct plane of the carriages must next be found by adjusting the thumb-screws of the standards on either side of the machine until the points of the pens just touch the blanket. Altogether unlike the other parts of the machine already dealt with, the spindles and bearings of the carriages must *not* be oiled. They must, of course, be kept very clean and free from dust, the steel spindle especially; but I want to impress the reader clearly that no oil should be used. To the sceptical I would say use black-lead, if you like, but do not use oil. The operation of striking is frictionless so far as the carriage bearings are concerned, and the application of oil to them gives greater freedom of movement than is required, and does much to bring about the jar of the pens so much detested by rulers in striker work. (See sketch marked Bg.)

THE PENS.

No other instrument of workmanship common to the ruler has been the subject of so much diversity of opinion as to preparation and usage as the pen has. Nor can this be wondered at, for none other is of so much importance. The pen, when set in the slide, becomes that part of the machine by which the actual process of ruling is brought about, and the actual ruling is what is subjected to examination in order

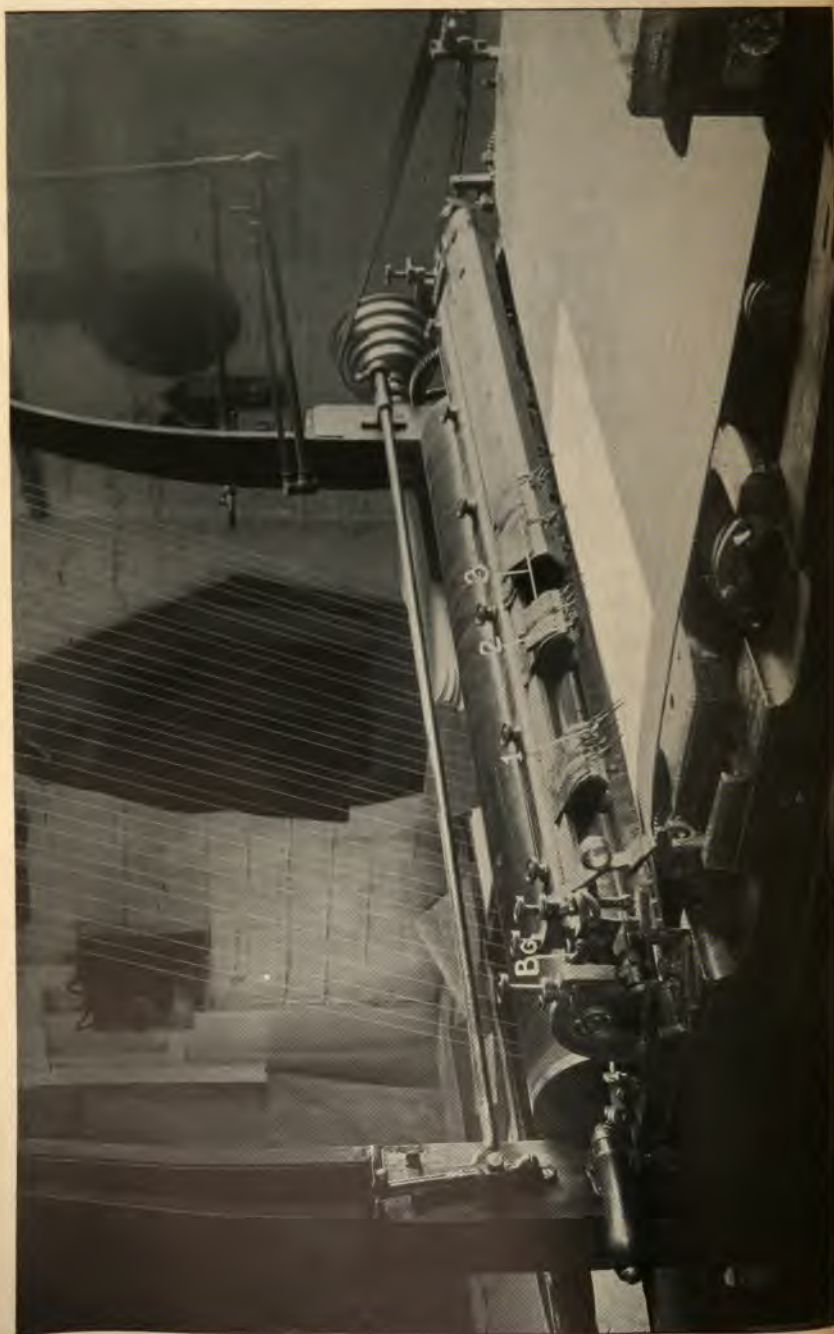
to define the quality of workmanship. The pen is the life of the trade so far as this process of paper-ruling is concerned, and I would recommend that all apprentices and beginners to our trade make the culture of it a subject of special study. There are two kinds of pens, viz., English and American, which may be either manufactured for the trade by a pen-maker or by the user himself, which latter usually adopts the English style; and whilst much depends upon the quality of manufacture, the style itself is a matter of personal taste on the part of rulers generally as to which is the best. Personally, I am a convert to the American style, not on account of the style only, but rather because they lend themselves more easily to the system of cultivation which I adopt. By the use of the word "cultivation" I do not mean preparation only, but a system of it which combines ease of working with adaptation of the pen to various grades of paper; and it is the cultivation, and not the pen itself, by which the best results with the least amount of trouble are attained. I do not put forward my views of the culture of the pen as being the most perfect of all, for I am not conversant with the various methods adopted by the many different workers in our trade. I quote them as being simple.

Let us assume that we have a row of new pens to prepare for feint-lining. If they be of English manufacture they will doubtless be supplied in the flat state, cut from the single sheet latén brass. They must, therefore, be bent, and the work of bending will rest with the user, who should carefully round them on the back until they reach an angle of about 45 degrees when set in the slide. If they be of American make they will be already bent on the back, which is composed of two thicknesses of brass, to an acute angle of about 30 degrees; and whilst this acute angle is fit and proper for the good working of the American two-ply back pen, it is ruinous to the life and work of the English pen, unless it be cut from brass of an extra thick quality, because it takes away the suppleness

of the back and allows the point to hang limp or shake with the vibration of the machine. As already stated, the angle for working should be 45 degrees, or thereabouts; and it becomes necessary, therefore, to press the back of the American pen to this angle before putting it into the slide; for to do so when set ready for working would produce the same effect upon the American as the acute angle does upon the English pen, *i.e.*, render it limp. The bar should next be taken in the hand, and holding it firmly, but without any undue force, draw it smartly across a sheet of not too coarse sand or glass paper, keeping it as flat as possible, so as to file away the heels of the pens. When this has been done, a fine cleanser must be drawn down the channels of the pens in order to remove the splinters of brass caused by the scraping process. The channels of the pens may now be nipped with ease to the desired width, and the toes straightened at the same time (if any have been twisted). The pens may now be set ready for work; and when this has been done, a couple of pulls with a sheet of sand-paper upwards, not in the direction in which the cloth travels, should suffice. In the case of a slide of pens already set this process is impracticable; still, the shoe of the pen may be rounded by putting a little more pressure upon the pens than is required for ruling, and sand-papering upwards, not flat, as is usually the case.

With down-lining pens the heel is still taken away, although the process is carried out by holding each pen, whether it be a double, single, or two for column ruling, in the hand and scraping the back of the channel at the point with a piece of sand-paper mounted on a strip of mill-board for the sake of easier handling.

To those accustomed to using pens with the shoe flat, this may seem unnecessary labour, but it is performed to enable the ruler to successfully combat the many classes of "full" or "cockled" paper with which he has constantly to deal, and I recommend its adoption as a simple, quickly performed



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and certain method of obviating broken lines—it is, in fact, the secret of striker ruling. Not only does this system ensure better workmanship, but its practice affords greater pleasantry to the worker. It is essential, if good work is to accrue, that every point be in good condition. It behoves the ruler, therefore, to glance at every individual pen before putting it into the slide to see that it is not twisted in any way. More so this should be made the rule in the case of double and treble pens; for a twisted toe, or a point so sharp as to tear the paper in striking it, will cause much trouble in blinding the line.

Setting both for cross and down-lining should be to the head, and the head should be the lay-edge for both operations. Only in extreme cases should the tail be made the lay-edge, as, for instance, the cross-lining by hand of small quantities of paper upon the first and third pages, when they may be struck from the centre and run off, or the down-lining of jobs struck from one head only, which, for the purpose of time-saving, may be lapped, and in the ruling of invoices for this same reason. Laying to the tail is, generally speaking, an unwise course. It is advocated by some men on account of its solution to some extent of the problem of visible vibration in striker work. This I grant, so far as the appearance of joining the headline is concerned; but in intricate striker work the evil is still very apparent, the only real solution to it being a correctly placed carriage and properly prepared pens set to the correct angle without leaning to either side in a good slide which grips every pen. The heaviest of patterns may then be struck without tremor. If a rubber band is used in striking, the jar-resister must also be used.

The head, moreover, is the recognised lay-edge of the printer, folder, cutter, and binder, and this alone is sufficient to warrant the ruler working by a system most suitable to the majority of the hands in other branches of the trade. But further and more important still to the ruler in this matter is the down-lining of a job with a good number of understops

which strike from three, four, or more positions in the box headings. By making the head the "lay" or "strike" edge, the whole of the pattern, consisting of any number of understops of different lengths, providing that they do not take up more box space than about 2 inches, that is, that the space between the points of the pens in the top gripper of the slide and the points of the pens in the bottom one are not more than 2 inches apart, may be worked off in one carriage at one operation; whereas, in the event of making the "tail" the lay-edge, two carriages would have to be set, and possibly the job would have to be put through the machine two or more times, according to the nature of it, in order to complete it.

Automatic striking has of late years been brought to a high state of perfection, both by the skill of the machine-makers and also on account of the attention which has been bestowed upon it by operators themselves, and it is now possible by means of the pen-over-pen system of setting to strike from two or more distinct heads and pick up at a foot-line in one carriage at one operation. This may seem somewhat vague to the uninitiated, and, on first thoughts, one may be inclined to question the value of its use upon a double-striker machine. However, it is useful, and it is profitable too, providing that one has about a ream of paper to rule, for whilst the first carriage is employed with the two strikes, the second may be utilized for the working of a third. The name given to this system is suggestive of what it is, namely, one pen ruling directly over the line made by another. In detail it is this: set one pen, either single or double, in the third or fourth gripper of the slide—that is, in the same gripper in which the other understops are set, and in alignment with them, and another pen, either single or double, similar to the first, in the top gripper and directly above the one in the third gripper, so that when wrapped with wool and fed with ink the top pen will rule a line exactly on the one ruled by

the bottom pen. The new beginner will have need to practise the setting of the two pens before becoming anything like adept at it, and some difficulty may at first be experienced by the double lines running blind; but providing they are set in a good slide which grips them firmly and without any leaning to either side, there should not be much trouble in this respect. The sketch marked No. 2 will enable the reader to understand more clearly what the system is.

There is also the method of striking a line, or lines, and running others through in one carriage at one operation. This is performed by bending the pen which is to rule the continuous line so that it touches the paper with sufficient pressure to rule during the time that the carriage, riding the cam, has lifted the other pens clear. Accuracy of setting is, of course, the chief factor in this case, for the pen which is to rule the continuous line receives the self-same shock at the rise and fall of the carriage as do the other pens, but, if set dead straight and gripped firmly, the point will not be affected by the vibration. This is another instance of the necessity of taking away the heel of the pen, it being impossible to carry out this system with a flat shoe so far as the continuous line is concerned. (See sketch No. 1.)

COLOUR WORK.

Two or more colours may be worked in one slide at one operation upon either a straight running or striker machine, although I do not recommend the working of more than two colours in one slide unless absolutely essential, on account of the tax upon the operator both as regards the arrangement of ink-feed and watching the job during the process of ruling. It is better, if a third colour is required, to utilize the auxiliary carriage for the purpose. In all cases where the working of two colours in one slide is to be carried out, a dry slide should first be procured, and the grippers of it which are to be used for the reception of the pens, that are to form the

pattern must be well greased by passing to and fro between the laths a piece of ream wrapper saturated with oil. The whole of that portion of the slide which is to contain the pattern must be treated in this way, and then the slide should be screwed up and any superfluous oil wiped off. This process is necessary in the use of any kind of pens, but with the American two-ply back pens the need is still greater, because the double thickness of brass does not allow the grippers to clamp closely together, even though the pens be firmly clenched; thus the ink works its way into the slide unless well greased; and, further, the nature of the two-ply back is such as to cause the ink to pump when striking. The next step is the setting of the pattern, and presuming this to have been done, the pens should be wrapped with wool, which is far preferable to strips of flannel, especially when one has a good number of understops running. Single white Berlin is the best for the purpose; double wool is much too thick and coarse. It should be well washed in the colour for which it is to be used, and wrung out, leaving it sufficiently damp to enable it to hold to both the pens and slide without blotting. We will suppose that the colours required are to be red and blue, and the slide one that is used for red work. The pens which form the red portion of the pattern should be wrapped first. Understops must be wrapped to a depth corresponding with that of the top pens, otherwise the top pens will not be sufficiently fed with ink, while the understops will become flooded and blot. For instance, understops which are set in the third gripper would be amply fed with two or three wraps of the wool, those in the second gripper four or five, whilst the top pens would probably require to be wrapped seven or eight times, according to the degree of slope at which they are being used. After each pen has been wrapped, the wool should be carried to the top of the frame. In the case of heavy patterns many yards of wool are brought into use by this system. Still, it is much in advance of the old system

of feeding from strips of flannel, inasmuch as it reduces the chances of shaking ink-spots to a minimum. Next, a strip of flannel about 4 ins. broad and sufficiently long to cover the whole of the red wool should be placed on the top of the frame, about $\frac{1}{2}$ in. away from the gripper. More flannel may be required if the pattern is a somewhat heavy one, and the edges nearest to the extension holder lath should be fixed to the carriage at intervals by means of pins or tacks. The ink must now be trained down the channels of the pens either by the brush or a cleanser, and the red portion will be ready for use, providing the ink is not allowed to corrode. The arrangement of the wool and flannel for the feeding of the pens which are to rule the blue portion of the pattern is carried out on the same principle, except that a strip of oil-paper or india-rubber silk of the same length as the pattern to be ruled in blue, and about 3 ins. broad, should be placed on the top of the red flannel in alignment with the blue pens and close to the gripper, to enable it to be fixed to the frame, leaving room at the top for feeding the red flannel from the brush without chance of touching the blue feed. The reason for placing the red flannel half an inch away from the gripper and the oil-paper or silk close to it, is that the latter may be tacked directly to the slide, thereby reducing the chances of mixing the colours which would arise were the tack to be put through the red flannel. The blue wool will be laid on the top of the oil-paper, and the flannel on the top of that, without protruding over either of the edges, and fixed to prevent it slipping away by tying round the carriage and slide at the outer edges of the flannel a piece of thread. In the case of long patterns it may be necessary for it to be tied several times. (See sketch marked No. 3.)

For the ruling of a line of two colours, *i.e.*, a fancy treble, the centre pen should be placed in the third gripper, and the double, which should be widened to form the two outside lines, in the top gripper. The feeding of the top pen is brought

about in the manner already described ; but that of the bottom differs somewhat, and for the sake of preventing the mixing of colours a long, narrow strip of oil-paper should be used, extending from the screw-lath on the top of the frame down to the pen, and on the most convenient side for working. The ends of the oil-paper should be fixed firmly to the slide at the bottom by means of a pin bent at right angles about $\frac{1}{8}$ in. from the point, placed a little higher than, and about $\frac{1}{2}$ in. away from, the pen itself, and at the top by placing a tack in the frame just below the screw-lath. The pen should then be wrapped with wool and the ends brought round the bent pin, along the oil-paper up to the tack, around which they may be loosely wrapped. This will be found sufficient to feed the pen ; the placing of a flannel over the wool is not necessary.

In order that the reader may more easily commit to memory the chief factors herein contained, I have thought it well to give a summary of the chapter.

1.—See that the guide is straight before commencing a job by ruling a sheet on both sides and “ shining ” it.

2.—Adjust the gate so that it works in harmony with the side-lay or guide. Do not alter the guide to suit the position of the gate.

3.—Get the cords all of one strain, and vary the tension to suit the different classes of paper being worked.

4.—Run the blanket with a slight dip between No. 7 roller and cylinder No. 3. Only during the striking of very thin papers should the tension be higher.

5.—Adjust the brass rollers Nos. 1 and 2 to meet the blanket in striking. For manifold and thin bank papers they should be so arranged as to allow the cloth just to touch the cords.

6.—The arms of the cloth-guide roller should touch the cloth on either side of the blanket.

7.—Keep the blotting rollers in a clean condition, and see that the driving belt is not running any of them in the wrong direction.

8.—Keep the parts well oiled, but do not grease the bearings of either of the carriages.

9.—Take the flannels, wool, and brushes out of the basins every night and allow the ink to stand ; it will strain itself, and in the morning the clean ink may be poured off into another basin.

10.—Wash the flannels, wool, and brushes periodically in warm water.

11.—Always grease a slide before using it for a colour other than that for which it is generally intended.

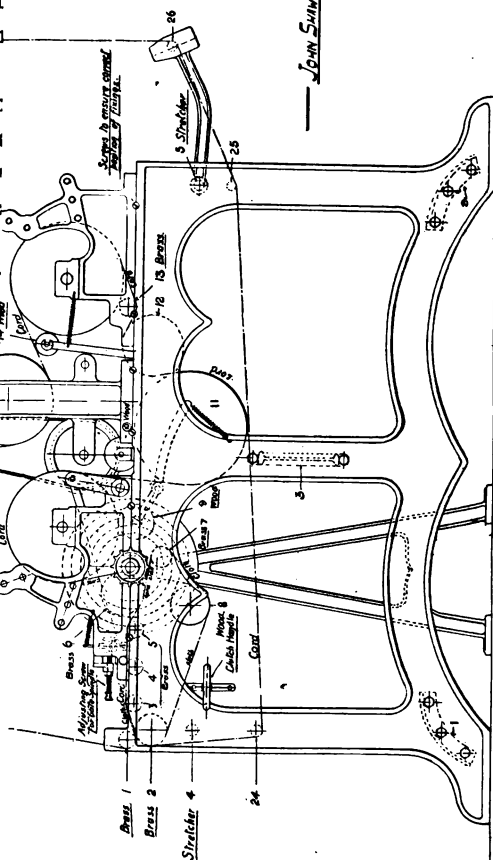
12.—To prevent the blinding of a double line, dry it, and then draw a piece of slightly oiled blotting-paper between the points, *i.e.*, repeat the drying process, but with oiled blotter. Sometimes it is advisable to draw a piece of doubled sand-paper between the points.

13.—To avoid visible vibration in striking, the carriages must be properly balanced, and to do this it is necessary in some machines to screw the carriage towards the operator so that the leaf is only allowed to ride on about half the off-side or deep cam. The American pens should be set in the slide just sufficiently far out to allow the acute angle to be seen.

14.—In the striking of very "full" or "cockled" paper, greater accuracy may be obtained by raising the cam a little prior to fastening it into the well of the cam-head, thereby bringing about a steeper drop of the carriage. (See sketch.)

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— JOHN SHAW & SONS' NEW "IMPERIAL" DISC RULING MACHINE. —

of the line is brought about by the passing of the sheet of paper to be ruled under the ink-coated surface of a revolving disc, or number of discs, according to the quantity of lines to be ruled. So much for the nature of the machine.

WHAT THE MACHINE WILL DO.

The disc machine is capable of producing work of a high standard of quality, providing it is under the care of a competent operator, and whilst the invariable rule has been to use it as a two-side cross-liner, or for simple classes of down-lining which are of sufficient quantity to warrant their being worked two sides at once, the machine is worthy of a place more important in any general commercial office. As a cross-liner of machine-made papers it is much in advance of the pen machine, both as regards quality of work and speed, and much more easy of manipulation. As a down-line striker, the heaviest of patterns, providing they are of the straight running order and that the length of sheet does not exceed the circumference of the cylinder, less the amount of space taken up by the rise and fall of the gate, may be ruled in less time than would be taken by the pen machine, and be of better quality; upon many hand-made papers also the result is satisfactory.

The reader must not confuse the foregoing statement. By the use of the phrase "heaviest of patterns" I do not mean intricate work in which a number of lines of different lengths appear on a sheet, but a number of lines—say thirty—struck from either one or two heads and run off the sheet. Let me here make it plain that the disc machine cannot, from a competitive point of view, successfully compete with the pen machine upon intricate classes of striker work.

An outstanding feature of the disc machine is that, no matter how great the quantity of lines put upon the sheet or what the quality of paper be, it will not be injured in

any way by dampness ; this is on account of the very minute quantity of ink put upon the paper. In some instances a sheet of foolscap will be perfectly dry upon the top edge before the discs have reached the bottom edge. This is made very apparent in ruling upon the second cylinder : the front edge of a royal sheet will be touching the cloth-covered roller while the rear end is still being ruled.

A noticeable deficiency of the machine is the absence upon it of the change-wheels device. In this respect it favours somewhat the old style of cylinder gate-lift, many of which are in use at the present time upon some pen machines. This deficiency is met to some extent by the addition of an auxiliary gate-cam, which in the striking of sheets up to the size of foolscap serves its purpose well. This auxiliary is fixed directly opposite the customary cam, thereby causing the gate to lift twice to one revolution of the cylinder. The advantage is lost, however, in the case of sheets of the size of large post and upwards, should the lines be run to the extreme edge of the sheet ; consequently the whole of the cylinder of $39\frac{1}{4}$ ins., or whatever size it may be, must revolve once in order to rule the $16\frac{1}{2}$ ins. or 21 ins., as the case may be. But it is when engaged upon metallic, glazed surfaced, and spongy papers that the disc machine is seen at its best, and we can now get a splendid result upon any of these makes of paper—in fact, the disc machine will successfully rule a stout blotting-paper. This is due to the wafer-like surface of the disc upon which the ink is transferred from the duct roller to the paper.

HOW TO WORK THE MACHINE.

Being built for the ruling of paper, it follows naturally that the disc machine will have many points in common with its contemporary. For instance, the feeding-board, guide, lay, and system of feeding—either by hand or automatically—are a facsimile of each other, and both machines depend to a great extent upon cords and blankets.

Of these things, however, little need now be said, as I have dealt with them in the article on "The Pen Machine."

In order to portray more clearly the parts of the machine, I have chosen a diagram which is used by engineers for their guidance during the building process. Parts which do not show to advantage on the sketch will be dealt with individually.

Let us take first the feed-blanket. It is composed of strongly woven black material, selvaged and endless, and it pursues its course round No. 2 brass roller, over Nos. 3, 4, and 5 brass rollers, under No. 6 and round No. 7 brass rollers, under No. 8 wooden roller, which is its tension roller and is fixed in a sliding bearing, back to the starting point. It will be seen that it is much less than the blankets with which pen machinists are familiar, and that there is only one. This is because it is used exclusively as a feed-blanket, and not as in the case of those upon the pen machine, viz., sheet-carriers. This latter part of the working is performed by the cords which appear both under and over the sheets.

THE CORDING OF THE MACHINE.

On the latest makes of machines there are three sets of cords, viz., front, under, and back, although the diagram is that of a machine fitted with two sets only, *i.e.*, front and back; but it is with the latest class of machine that I propose to deal.

The alteration from the two to three sets is brought about by the introduction of two small rollers, each about $\frac{1}{4}$ in. diameter—one grooved and placed level with and about $\frac{1}{4}$ in. away from No. 13 brass roller, towards the back; the other, a plain one, being placed about 4 ins. below it.

We will commence with the front cords and work by the diagram, starting midway between rollers Nos. 23 and 1 brass, this being the juncture at which the process should be commenced. Carry the cord under the last-named roller

along the feed-blanket, under brass roller No. 6, upwards round the front cylinder, down under No. 11 cylinder, upwards over No. 12 cylinder, over No. 13 brass roller, upwards round the back cylinder, under No. 15 cylinder, upwards at the back of No. 17 stretcher roller, round No. 18 cylinder, along the frame towards the back of the machine, upwards round No. 20 brass roller, back again along the frame towards the front of the machine, over No. 21 roller, under No. 22, over No. 23, and down to the starting point.

The under cords are commenced at No. 24 roller; carry up round No. 2, along the feed blanket, under No. 6 brass, over the front cylinder, down under No. 11, up over No. 12, over No. 13 brass, down at the back of the additional plain roller, down round No. 25, which is its tension roller, through the frame towards the front, under No. 24, and fasten.

For the back cords commence under the distributor, or lay-boy, and carry under No. 26 roller, which is the tension roller for this set, upwards round the additional grooved roller, upwards round the back cylinder, under No. 15 cylinder, at the back of No. 17 stretcher roller, upwards round No. 18 cylinder, along the frame towards the back of the machine, round No. 19 brass to the starting-point. The method of tying is the same as shown in sketch for the pen machine.

It will be seen that the front and under cords run conjointly with each other from the feed-blanket to No. 13 brass roller. The under set takes a downward course at the point, and the back set takes up the running from the additional grooved roller, to which I have already referred, when both front and back sets pursue their course together to the distributor, *i.e.*, brass rollers Nos. 19 and 20.

The procedure of cording is somewhat intricate, and it behoves all operators to become acquainted with it. A good plan of self-tuition is to tie a piece of coloured wool to a cord, turn the machine slowly by the handle, and mark its progress as it travels round.

When two or three cords of each set have been put on, a small sheet of paper should be turned through the machine between the cords, in order to see that a proper course is being maintained; other cords may be attached as desired.

The tension rollers of the cords are, for the front section, No. 1 brass and No. 23 steel rollers, and for the back section No. 26 steel roller, whilst upon some machines additional tension is lent to this roller, inasmuch as the arms upon which the bearings of it are fixed are portable, and may be either raised or lowered accordingly.

Wooden rollers Nos. 9, 10, 14, and 16 are provided for the purpose of being covered with blotting-paper in order to dry any superfluity of ink. The parts at the right and left feet of the machine marked 1 and 2, that midway of the frame at the bottom marked 3, No. 6 in the top left-hand corner, and Nos. 4, 5, 7, 8, and 9 marked "stretcher," serve to bind the two sides of the frame together and keep the machine upright.

Much depends upon the quality of thread which is used. It must be fine, but strong, and the knots must be made as small as possible, because the under cords run under the sheet at the time it is being ruled; and should the knot be a large one and a narrow distance of discs be used, the pressure of them upon either side of the knot will either cause it to burst through or leave a permanent impression upon the paper. This is one of the points which should be remembered in the cording of the machine.

The cords, also, play an important part in the motion of the machine, for, with the exception of the front and back cylinders, which are driven from the pulley, the other cylinders and rollers obtain their motive power from the cords, and it follows, therefore, that they should be fairly tight, and that the bearings of the cylinders and rollers be kept well oiled. It is a necessity to occasionally relax the tension rollers and take the cords up; the gradual slackening of

the cords brought about by the constant running of the machine may be largely coped with by this method.

THE CYLINDERS AND ROLLERS.

The front and back cylinders, which are composed of steel, are to the disc machine what the pen-board is to the pen machine, viz., the bed upon which the process of ruling is carried out. They are covered with a stout, evenly woven black blanketing, which must be good material and endless. This blanket must be very carefully drawn on to the cylinder, for if it be uneven or the cylinder faulty so far as the surface is concerned, the machine will not be of much service until the defect is remedied. The other cylinders, Nos. 11, 12, 15, and 18, which are also blanketed, are, for the sake of ease of driving, composed of papier-maché, which is built round a steel frame. They are made in cylindrical form, in order to avoid any acute bending of the sheet in its passage around them. No. 11 is the reversing cylinder, and No. 12 an intermediary provided for the purpose of keeping the sheet from slipping during its transit from No. 11 cylinder to the back ruling-bed. Both these rollers should be perfectly round, that is, the circles should be equally parallel from end to end; any deviation will cause the sheet to skew, because there will be a constant series of grip and relaxation of the cords brought about by the rise and fall of an unevenly moulded surface, and thus the register, when ruling the second side, will be faulty. In the British machines the reversing cylinder is built in an eccentric bearing, and this to some extent acts as a palliative to the evil of bad register. But the greatest insurance to good two-side work, when handicapped by faulty cylinders, is to release No. 17 stretcher roller and allow it to work limply with the cords; this will have the effect of keeping the cords at one tension all the time. It may be done by releasing the bolts which bind it to either side of the machine. The free use of oil

is, of course, a necessity to the easy working of the cylinders and rollers, and I would recommend that every operator take a glance at the bearings every morning before commencing to run the machine. I have seen some very curious mishaps which could be directly traced to want of oil. On one occasion a machine suddenly stopped dead, and threw the driving belt off. It defied all efforts to move it; but on the arrival of an engineer some two hours later, it turned quite easily, and, after a somewhat profuse application of oil, it was discovered that one of the main bearings had run hot and expanded. On another occasion the discs commenced to jump up and down upon the cylinder. One or two drops of oil put into the bearings of the rubber roller and pinions afforded pleasant relief in this case.

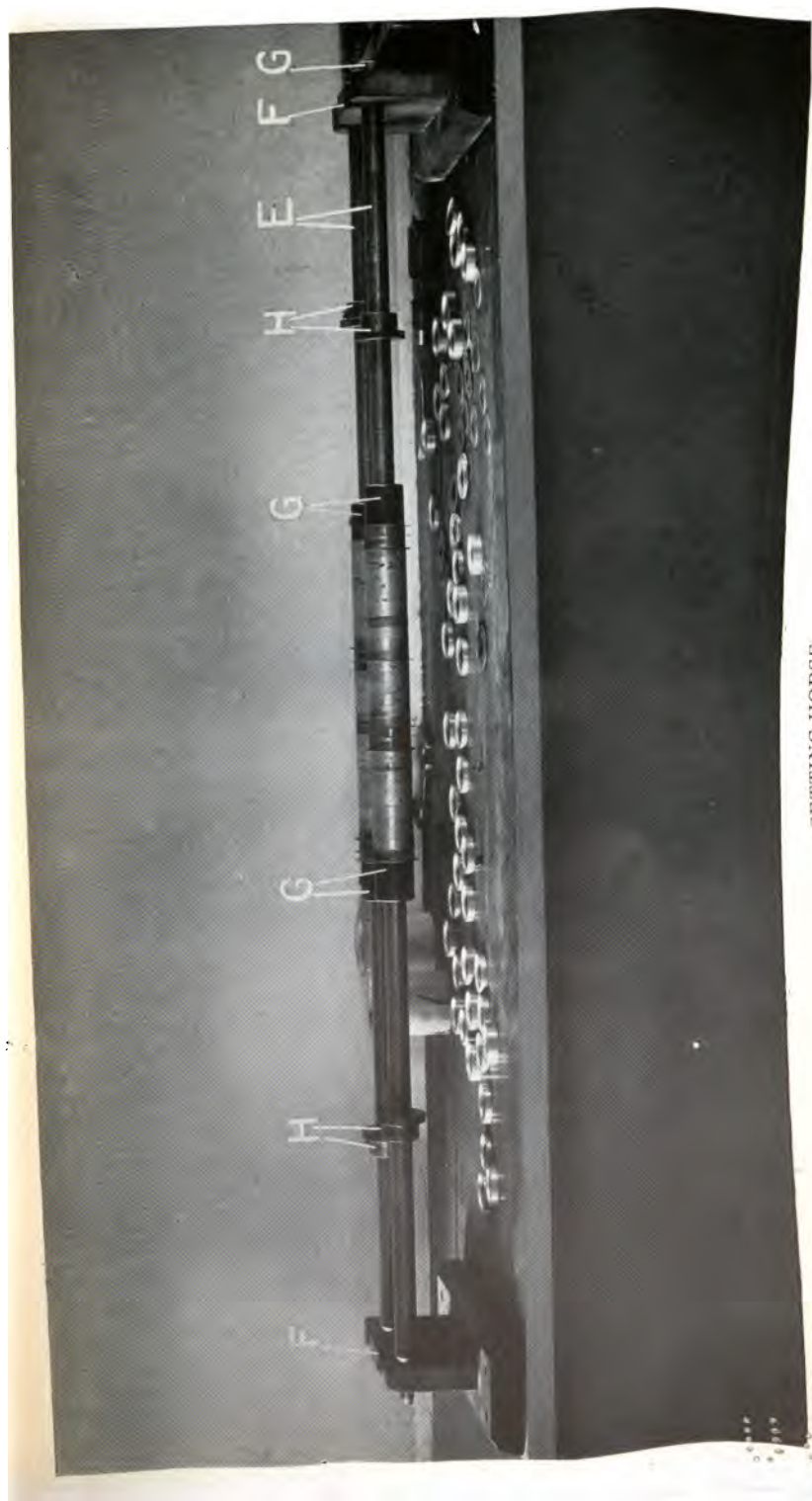
Periodically, and according to the amount of work done by the machine, the blankets of the cylinders upon which the ruling is done will require to be washed, and for this purpose hot water and ammonia should be used, which should be applied with either a soft brush or a good-sized duster. No unnecessary weight must be used, and care must be taken that the water be not allowed to touch those cylinders which are composed of papier-maché, otherwise they will warp in parts. These rollers should be brushed occasionally, as should also the feed-blanket. The machine would, of course, be stripped of all material likely to be affected by damp prior to the washing process, and, after being washed, the blankets must be allowed to become perfectly dry before again working the machine.

THE SETTING OF THE DISCS.

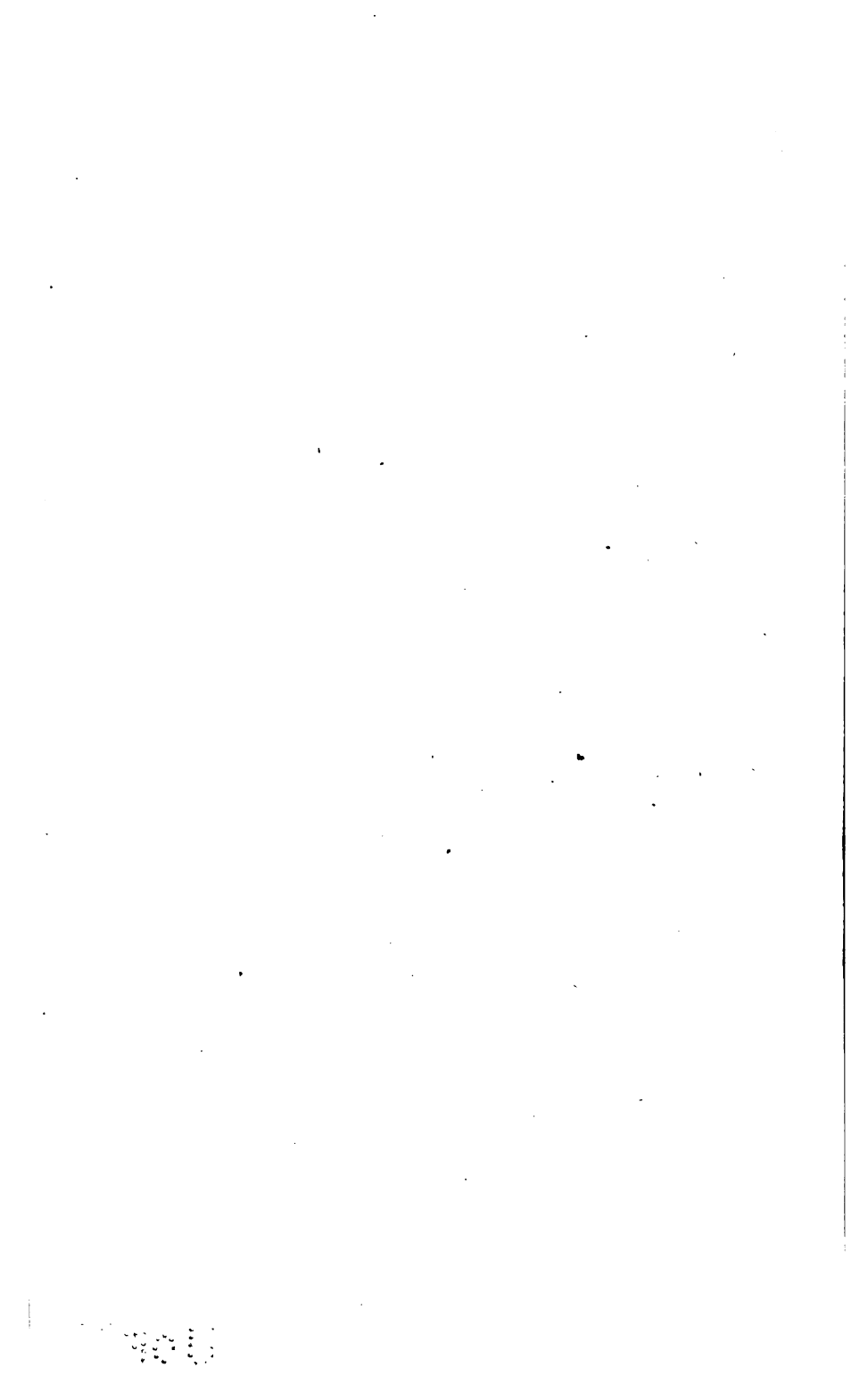
The disc is equivalent in this system of ruling to the pen in the pen system, the article forming the line by bringing the ink into direct contact with the paper. It is circular in shape, about $1\frac{3}{4}$ ins. in diameter, and cut from

brass, which varies in thickness according to the nature of the line which it is to rule. The thicknesses most common are between the points $\frac{1}{8}$ in. and $\frac{1}{16}$ in. at the base or edge of the inner circle. The outer edge, upon which the ink is conveyed, is cut or bevelled to a much finer degree, and the discs are numbered 3, $3\frac{1}{2}$, 4, 5, and so on, according to the cutting of the outer edge. Double discs, *i.e.*, for the ruling of double lines, are given the double number, 3 3, 4 4, etc., as a mark of distinction. The centre, to the extent of about $\frac{3}{4}$ in. in diameter, is cut away to allow the disc to slide upon the spindle. The spindle is a solid, round, steel bar of the same length as the machine is wide, and portable. (See sketch E.) Both the ends are turned somewhat smaller than the body, and this is done for the purpose of insertion into the bearings on either side of the machine. One of the ends is bevelled in order that it may be inserted into the bearing without fear of damaging the face of it; the other is sheer, and upon this is fitted a collar, which governs the play of the spindle when working. This collar must be adjusted before commencing to rule, and an occasional glance given to it to see that it keeps properly locked. The process of adjustment is carried out by bringing the shoulder of the spindle flush up to the bearing and locking the collar, which must also be flush at the other side of the bearing, then oil freely.

For the actual process of setting the makers supply a setting-well. This is composed of two triangular lengths of wood, fastened together so as to leave the centre hollow, in which to rest the discs when put upon the spindle. I do not favour this system, because it allows the face of the disc to come into contact with the sides of the well. This is wrong. The faces of the discs should not be allowed to touch anything when set; it is liable to scratch them, and thus give to the line a dotted or broken appearance; and I suggest that each operator—or, shall I say, each machine?—



SETTING-HORSE.



be provided with a setting-horse, which consists of two double-grooved wooden stands about 6 ins. high fixed upon a table so wide apart as to allow the journals of the spindles, *i.e.*, the parts which revolve in the bearings, to rest in the grooves. (See sketch F.) The bevelled end, although, as already stated, it is really intended for the purpose of easier insertion into the bearing, also serves as a guide during the setting process, inasmuch as it represents the left-hand side of the machine. It should be placed in the left-hand side groove, and the rider, collar, discs, and spaces put on at this end.

The word "space" must be taken technically, not literally; for, whilst it means "distance from one line to another," it at the same time infers the use of material substance to bring about the distance desired between the lines. This material substance is composed of white metal in the shape of a circular disc, and is about $1\frac{3}{8}$ ins. in diameter, or $\frac{3}{8}$ in. or thereabouts less than the disc proper, and of varying thicknesses. They are numbered $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, and onwards up to 10, and they signify the $\frac{1}{108}$ th, $\frac{1}{54}$ th, $\frac{1}{27}$ th, $\frac{2}{27}$ ths, and other fractional parts of an inch respectively.

A single disc is the equivalent of a No. $\frac{1}{4}$ space, which equals $\frac{1}{54}$ th of an inch, or two No. $\frac{1}{4}$ spaces. A double disc is the equivalent of a No. 2 space, which equals $\frac{2}{27}$ ths of an inch, or eight No. $\frac{1}{4}$ spaces, and in all cases of setting to a given size in inches the space value of the discs themselves must be considered.

For instance, in the setting of feints, four to the inch, the spaces between each disc would be a No. 6 and a No. $\frac{1}{4}$. These would equal 25 No. $\frac{1}{4}$ spaces, or $\frac{25}{108}$ ths. There are four lots of these two sizes of spaces, and it will be seen that the total width taken up by them is the equivalent of 100 No. $\frac{1}{4}$ spaces, *i.e.*, $\frac{100}{108}$ ths. The remaining eight No. $\frac{1}{4}$ spaces necessary to make up the inch are provided by the discs themselves, there being four singles, and each of them accounts for two No. $\frac{1}{4}$ spaces. This is the point system for which the disc machine is famous.

The collar is an iron band of about $1\frac{1}{2}$ ins. long, and the same height as the spaces ; one end is sheer and the other is bevelled for facility in handling. A thread is cut in it from the surface to the centre, and into this a screw is fitted, making the collar into a lock for use upon a round bar.

The rider is a collar with a flange of the same height as a disc on it. It should be placed at either end of the spindle, and will be found useful in enabling the operator to determine, to some extent, the correct plane of the spindle when in the machine. It locks by the same method as the collar. Much depends upon the accurate locking of the collars and riders, and it becomes important that the point of the screw be tapered, or conical-shaped, otherwise it will not bite the spindle.

Now let us suppose that we have a job to be set for ruling common cash columns two sides at once. First place two spindles on the setting-horse—bevelled ends on the left-hand side ; then slide a rider on each of them, and lock near to the right-hand end ; next, a collar may be put upon each of them, the one upon the nearest spindle being locked about two-thirds of the way from the left, the other may remain loose. Take the copy in the hand in an upright position, and fold it over towards the back midway of the sheet ; this will have the effect of strengthening it, and also, in the event of it being struck from a headline, show the lines at the edge or fold. The first spindle will represent the first side of the sheet, or the front cylinder ; the second spindle will represent the back of the sheet, or back cylinder.

We will commence to set the front pattern by sliding upon the spindle at the bevelled end a single disc—this will represent the last line of the “£ s. d.” columns ; carry it close up to the collar, then put one or more spaces, according to the distance between the “shillings” column, upon the spindle ; next, another single disc—this will represent the

second line of the "£ s. d." columns ; then spaces to make up the width of the " pounds " column, followed by a double disc. The " name " column should next be filled with spaces, which should, so far as is possible, be of one size or number ; then another single disc to divide the " name " from the " date " column ; repeat this process ; then another collar close up to this last disc for the purpose of locking the pattern upon the spindle ; and, finally, a rider locked near to the left-hand or bevelled end. Some rulers prefer to have a space between the collars and discs next to them, claiming that it pans the pattern together more solidly.

Such is the setting of the first, or front, pattern. We will now deal with the back. Whereas, in the first case, or front spindle, the "£ s. d." columns were set first and the " date " line last, in the second case, or back spindle, the " date " line is set first and the "£ s. d." columns last ; in both cases, however, setting is carried out from right to left. So we will place a single disc upon the second spindle at the left-hand, or bevelled end. The actual position of this disc is, to some extent, a matter of guesswork ; still, it may be determined more or less accurately by straightening the copy back to its original upright shape, and sticking a pin through the " date " line on the back so that it protrudes on the front. Hold the copy—front to view—in the thumb and fingers of the right hand so that it may be felt with the thumb when the "£ s. d." columns on the copy are exactly on the top of the corresponding discs of the front spindle ; then bring the disc on the second spindle in alignment with the pin on the copy (this may be carried out with the left hand), move the collar up to the disc and lock it. The remainder of the pattern should be set by counting the spaces and discs upon the first spindle, and repeating them upon the second, but in reverse order. (See sketch of the spindles.)

In the setting of front and back spindles for feint work, the back spindle will be a replica of the front, setting being

carried out from the tail to the head; that is, the disc which is to rule the bottom line will be put upon the spindle first, and the setting continued to the top from right to left. The head of the sheet will be the lay-edge, because the head of the patterns on both spindles are on the left hand or bevelled end of the spindle, and the bevelled ends are fitted into the bearings on the left-hand side of the machine. (I am taking it for granted that the guide is on the left-hand side of the machine.)

THE PROCESS OF RULING.

The process of ruling by the disc machine, like that of the pen machine, is divided into two classes, viz., run-through work and striker work. For the former class the tension of the cords is, generally speaking, the first consideration, and they must be in such a position as to grip the sheet as soon as it touches the feed-blanket.

This may be brought about by movement of the brass roller No. 1 and steel roller No. 23 (*see sketch*). It will be seen that No. 1 roller is in the position stated, so that, providing the cords are sufficiently tight to keep the sheet from skewing whilst it is passing under the discs, the position shown in the sketch may be copied so far as run-through work is concerned. Should the cords be somewhat slack No. 23 roller must be raised until the desired tension is found.

For striker work much depends upon the quality of the paper being used; still, the great secret lies in the "tension of the cords," which must, if anything, be higher than for run-through work. This may appear somewhat paradoxical to those who are accustomed to pen ruling; nevertheless, the higher the tension the better the results so far as accuracy is concerned.

The gate must first of all be put into action, and this may be done by turning the rest, to which a small thumb-handle is attached, over towards the feeding board. Next it must be seen that the sheet runs perfectly straight with the guide, and the gate must be set level by the edge which meets it.



The cords must be raised sufficiently high not to grip the sheet before it reaches that part of the feed-blanket under which No. 4 brass roller revolves. This is brought about by raising No. 1 brass roller, whilst No. 23 steel roller must also be lifted upwards in order to keep the tension high. Over-stops and short-stops may be combated by either tightening or relaxing the cords, as the case may be, upon the side of the machine at which the faulty striking is taking place. This applies to both over and under cords. Under cords, generally speaking, should be placed about 3 ins. or 4 ins. apart, but in the case of bank and thin papers as few as possible must be used. An abundance of under cords almost invariably causes the sheet to crease during its passage round the cylinders.

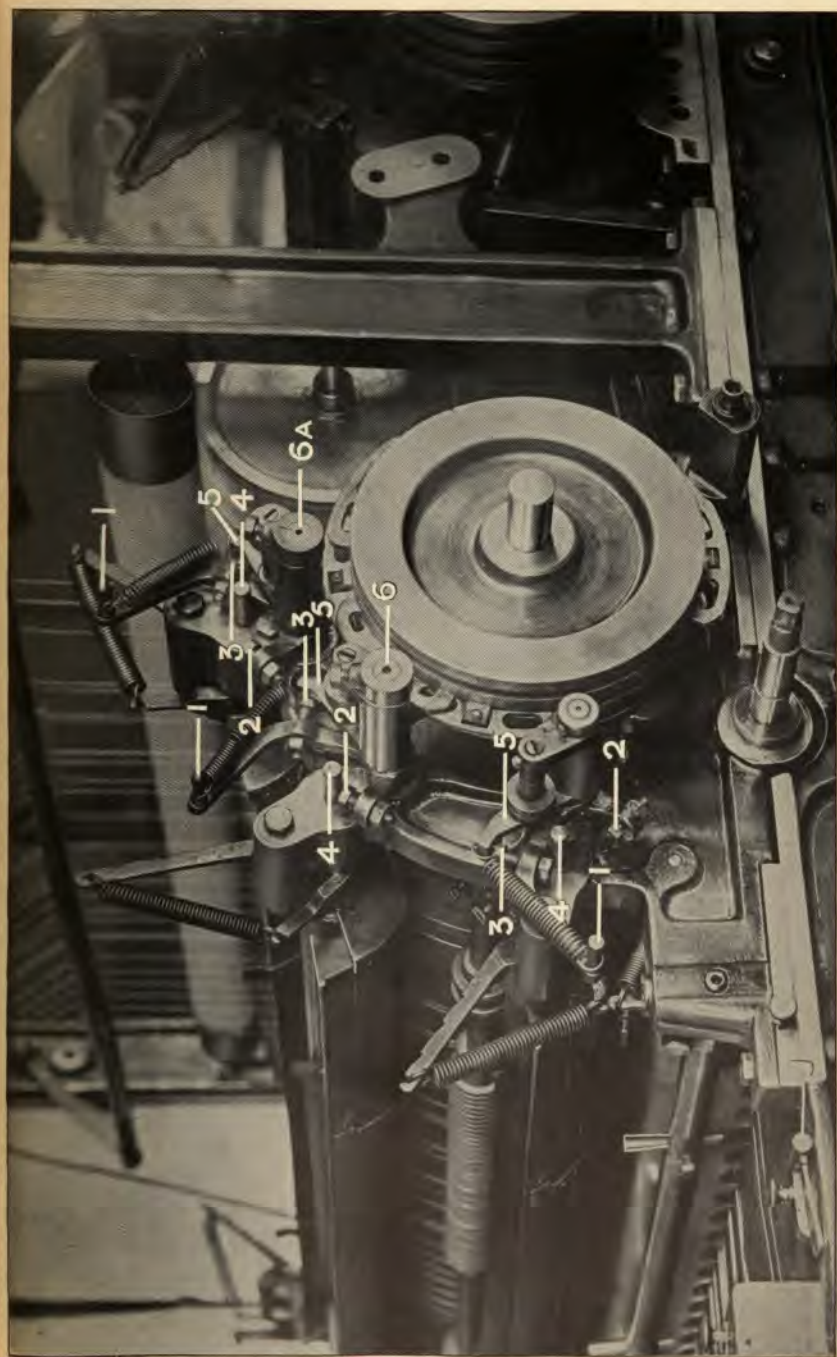
The cams, which must be set according to the pattern to be struck, differ very much in appearance from those in use upon the pen machine, although, in principle, they are the same excepting that they are fixed by means of a screw-clutch into the cam-wells of the cylinders. A lifting handle upon which a cam riding wheel is fitted is fixed to the lever-rod; the lever-rod, upon receiving the shock brought about by the cam striking the wheel, lifts the spindle bearings, and this causes the intermittent ruling.

The lifting handles are those parts of the machine which control the discs when set in it for working by either raising or lowering the bearings in which the spindles run (see sketch No. 1). Upon them are fitted two bolts (see Nos. 2 and 3). Each of these bolts is provided with a lock-nut, and in all movements of either of them it is imperative that they be locked before proceeding further. Each of them is provided with a bed or casting upon which to rest whilst the machine is working. No. 2 is for the purpose of regulating the amount of weight at which the discs should be allowed to ride upon the paper being ruled. The weight is either added or reduced by turning the bolt downwards or upwards.

Its bed is an iron rod built into the frame of the machine (see No. 4). No. 3 bolt is for use during striking. The casting which supports the cam-wheel is its bed (see No. 5), and this casting becomes part of the lifting handle by being coupled to it with a spring. Its purpose is to govern the amount of drop necessary to accurate striking by lowering the lifting handle nearer to the bed or raising it further away from it. Usually a drop of $\frac{1}{4}$ in. is sufficient to produce good results, but in the case of "full" or "cockled" paper more is required, whilst in very flimsy papers the reverse is the case. The cam-wheel support in the case of the second and third strikers is built upon an eccentric shaft case (see Nos. 6 & 6A), and this also proves a capital aid to striking. The meaning of the word "eccentric" is "odd." This casting is certainly an odd one, and its oddness is its outstanding feature. A movement of the case which envelops the shaft either raises or lowers the cam-wheel, and thereby assists in bringing about more accurate striking. It also bears a screw for locking it, and this must be attended to after any movement.

Plane or level is the governing factor of the machine, and this becomes clearly apparent in the use of the discs, for if the proper plane is not found and maintained during the working of the machine good ruling will be at a discount.

Assuming that the spindles have been set into their bearings, there should, and must, be an even pressure of the surfaces of them all the way across the machine—both upon the duct, or inking roller, which is composed of rubber, and the cylinder upon which the ruling is performed; neither must there be any undue pressure upon either of these parts. Too great an amount of pressure of the discs upon the rubber roller will cause them to cut into it, thereby damaging its surface, and, at the same time, robbing the discs of the full amount of ink which they should get; and if the pressure



COMPONENT PARTS OF STRIKER ATTACHMENT OF DISC MACHINE.

upon the cylinder be uneven or too heavy it will cause the sheet to skew whilst being ruled, and also show marks of indentation upon the paper.

Just as the proper culture of the pen is the secret of the trade of pen ruling, so is pressure and the proper plane of the spindles the secret of the trade of disc ruling.

To enable the operator to bring about the necessary level at which to work the discs, a gauge is supplied with the machine. (See sketch J.) Its calibre is exactly the same as the distance from the spindle to the surface of the discs, and it is used by being passed between the spindle and the rubber roller, and between the spindle and the cylinder, the discs being first put down as for ruling. It must just pass freely, but without any play in both cases. Prior to the testing of pressure upon the rubber roller the bearings' screws marked A, C, and D must be slackened, and then any desired alteration can be made by turning the screw marked A either one way or the other. A bearing appears at either side of the machine, and both must be dealt with. Having satisfied oneself that, so far as the duct roller is concerned, the pressure is correct, the screws C and D must be tightened, and the attention turned to the cylinder. Pressure in this instance is either applied or relaxed by the leaf screw marked B. This is, perhaps, the most important part of the whole machine, and great care must be taken of it; nothing but practice, however, will serve to give the learner a clear grip of the necessity of perfect plane.

It is most essential, both for the well-being of the machine and for the work which it does, that the spindle bearings be kept well oiled, and to do this the practice should be made of going round them twice a day. It will facilitate striking if the lever-head, *i.e.*, the castings upon either side of the machine which lift the bearings, be well greased before commencing to rule.

THE INK-FEED.

The system of ink-feed is much the same in principle as that in vogue upon printing machines, with the exception that a liquid ink is used. The duct, or ink-well, is a brass vessel of the same length as the cylinders, and about $1\frac{1}{2}$ ins. deep by $1\frac{1}{2}$ ins. wide, and must, of course, be watertight. It is fixed just in front, and a little lower than the top, of the rubber roller by means of two holders which appear on the front side. Ink is teemed into it from the basin, and the two loose edges of the flannel are immersed in the well and fastened to the pins on the inner side to prevent slipping. The fold should come just over the centre of the rubber roller on the top. The ink is being constantly drawn during the running of the machine through the flannel, as in the syphon system, on to the rubber roller, and the discs, by reason of their being set so that the surfaces touch the roller, convey by constant revolution the ink from the roller to the paper. The quality of ruling will depend entirely upon the manner in which the ink has been prepared. Some operators, in their efforts to produce a solid line, hang a flannel from a stretcher, which is fixed to either side of the machine and sufficiently high to allow it to feed the edge of the discs in addition to the supply gained from the duct. This over-hanging flannel must be fed from the brush, and it cannot be recommended for work where a great number of double lines appear.

The British makers have an ingenious method for distributing the supply of ink. It is in the shape of a brass lath of the same length as the roller, and with a strip of folded rubber attached. It is so arranged as to allow the strip to touch the roller, and pressure may be applied for the purpose of regulation by means of a thumb-screw upon either side of the machine.

Both of these systems, whilst being splendid aids to the ruling of patterns consisting of single lines, are of little

real value when engaged upon work in which a number of double lines appear, owing to the tendency of the double discs to run blind.

For this particular class of work a dry duct is required, and, instead of using flannel as in the case of run-through work, a strip of flannelette folded three or four times and placed in the duct and on the roller as previously described should be used. It must be fed from the brush, and sparingly, and at each application of ink the discs should be cleansed by passing through the nicks a piece of folded paper, which may, if desired, be slightly greased. When working jobs of this description the machine should be kept constantly running. If a stoppage be compulsory the discs should be lifted clear of the rubber roller by releasing the cap of the right-hand bearing, taking the journal of the spindle out, and resting it upon the screw marked C.

This system necessitates much careful attention on the part of the operator, but the results which are obtained by it are most pleasing.

CHAPTER VIII.

THE SELF-FEEDER.

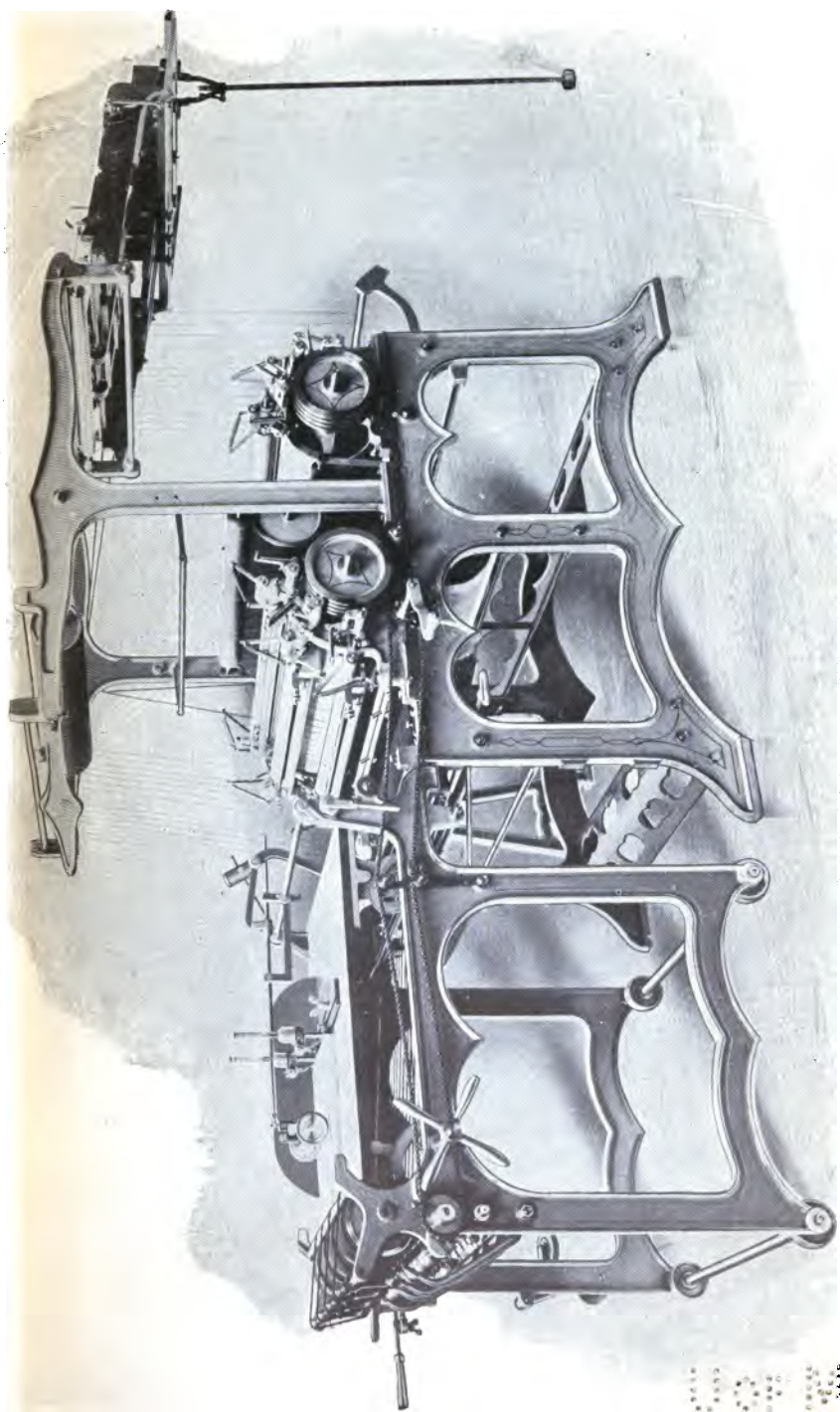
BY F. STENNING.

INTRODUCTORY REMARKS.

TO say that a self-feeder is an acquisition to the Ruling Department is as little as can be said; in fact, it is almost as indispensable as a rudder is to a ship—this is, of course, where the output of ruling machines is a consideration. The remark applies in this case, as almost in every other instance, that there is no better than the best, and the feeder hereinafter described is, in the opinion of the writer, the best. Without giving any particular name to this feeder, it may be stated that it can be had of either English or German manufacture, and it may be further added that an employer who does not use the self-feeder cannot possibly obtain the full benefit out of his ruling machines—especially disc machines—that he ought to do. We can recommend this particular self-feeder with every confidence, and, providing it is in the hands of a capable operator, it will prove itself to be a very valuable addition to the Ruling Department, and a safe and splendid investment to any intending purchaser.

ADVANTAGES OF THE SELF-FEEDER.

To speak of the advantages of this feeder, it can be safely said that it is all advantages, especially from an investor's point of view, its principal feature being that it is most reliable. Unlike boy or girl feeders, it never comes late, and one can



DISC MACHINE WITH SELF-FEEDER ATTACHED.

always depend upon it being there, and there is not that inconvenience experienced sometimes of feeders being away ill. Moreover, they can be worked any length of time without being subject to Factory Laws, and the question of wages has not to be considered; in fact, a ruler is never put to the least disadvantage by adopting the self-feeder.

This particular feeder will feed any kind of paper, and raises the output of the ruling machines 150 to 200 per cent. It takes up less floor space than any other feeder, which is an item of great importance. It is not absolutely necessary to use them for disc machines alone, as they can be fitted and used with success on any ordinary ruling machine, providing there is no part of the framework projecting under the feeding board. Numerous other advantages will be found from the self-feeder when in actual use.

GENERAL DESCRIPTION.

In giving a general description of this feeder, we will suppose for the moment that it is fixed to a disc machine—either one of Shaw's "Imperial" or a "Universal." It is driven from the main shaft by an endless chain—not that this feeder requires a great deal of power to drive, because the narrow belt used for an ordinary ruling machine is sufficient. I merely state this to show that there is no separate pulley or belt required. The feeder is held in position by two iron straps, and is thus made perfectly firm. Nearly the whole of the parts are either iron or steel, thus making it very rigid and firm, and doing away with the fear of its being wrenched, as some feeders do that are built in wood frames. It is fitted with three guides, and has an indirect feed, which is one of its principal features, that is to say, it does not feed deliberately from the feeding board into the machine, but away from it. The sheets are placed on the feeding board, and are delivered from off the board, around a roller and along tapes, underneath the board and into the machine, thus reducing the amount of crooked sheets to a minimum.

It may be of interest to give a more detailed description of this feeder. The sheets are placed to a fixed guide on the feeding board, and also a movable guide, to which is attached two knives which hold the sheets. These knives are held in position by a weight, which is made to slide up and down an upright, so that as the sheets on the board get less, the weight takes the knives down and still holds the top sheet until the last sheet is fed. The uprights are made to slide in a groove, and are easily placed in any position. The sheets are delivered by two rubber runners; these resemble a small V-shaped pulley with rubber rims, attached to what we will call a feeding arm, and by an ingenious cog and lever arrangement (ratchet wheel) these rubbers become locked, as it were, when in the act of feeding, and in the backward movement become released again, thus, by rubbing the top sheet, drawing it away from the knives. The whole of this arrangement can be lifted up by a handle, and fixed so that there will be sufficient room for placing the paper on the board. When the sheets are delivered from the feeding board they are gripped between tapes and a cloth-covered roller (in a similar manner as on a rotary perforating machine), and are curved round this roller, and so travel on to another set of tapes underneath the feeding board, which draw the sheets to another guide, and so are fed into the machine. Provision is made for feeding sheets of different sizes. The stroke of the feeding arm is regulated by two sets of pulleys, one, a set of three V-shaped pulleys attached, and the other an inserting and expanding pulley, and two intermediate pulleys; by this arrangement the operator can feed the sheets any distance apart he may desire, although it is advisable to feed the sheets as close together as possible—by doing this it preserves the cloths and cylinders of the machines. By way of illustrating this arrangement we will presume we have just finished faint lining a large post upright sheet, and we want to rule a royal oblong sheet. The round belt is running on the smallest

V-shaped pulley. The stroke of the feeding arm will not require to be as fast as it was for the large post sheet. By the lever expand the tooth pulley to its utmost ; if that is not sufficient, move the belt to the centre V-shaped pulley and gradually insert the tooth pulley until the sheets are being fed close enough, then if this is found to be insufficient, again move the belt to the largest V-shaped pulley, and by regulating the tooth pulley you will be able to feed properly sheets as large as the feeder will take. These remarks apply to feint lining and run-through work. With respect to striking work on the machines, the self-feeder can be converted to that purpose in a moment. Attached to the three-cone, V-shaped pulley is a cog-wheel, also one to the tooth pulley ; by simply taking off the round belt altogether and inserting an intermediate cog-wheel—which, by the way, is already fixed, and only requires sliding into its place—the feeder is ready for feeding to the striker. If the ruler is desirous of putting the double wing on the machine, so that he can strike two small sheets round the cylinder instead of one large one, a change wheel is provided for the purpose. By taking off the intermediate cog-wheel before referred to, and inserting a larger one, the feeder will meet the requirements of the double wing.

THE SETTING OF THE FEEDER.

If great care and a little trouble are used in the setting of the feeder much trouble will be saved afterwards. We will presume we have to feint line a job on medium. Take a sheet and fold it in folio, the fold being the same way as the feint lines have to be ; place the sheet, when opened out, up to the stationary guide and about a quarter of an inch from the front edge of the feeding board, then set the movable guide with the knives attached to the other edge ; arrange the knives so that they will be at an angle of about 45 degrees—they will be found to cut better in this position than if they were straight up—and set them about 3 inches from each end of the sheet. Put the knives down on the sheet so that they will keep it

in its place until the feeding rubbers are set, unscrew the nut which fastens the feeding arm, also the one in the support through which the rod (which we will call the connecting rod) passes, and the one which fastens the feeding arm to the connecting rod ; then the whole of this arrangement can be moved to any position. Place the feeding arm so that the connecting rod comes immediately over the fold of the sheet, put the handle on the machine, and turn it so as to bring the feeding arm to its utmost backward position, tighten the nut and the one on the support, put the feeding rubbers on the end of the connecting rod, and slide the rod in until the rubbers are within about 3 or 4 inches from the movable guide ; then tighten the nut. An arrangement is attached to provide three different lengths of stroke of the feeding arm—the shortest stroke will be found most convenient—and some weights are also provided to relieve the pressure of the feeding rubbers on the sheets, if this is required.

It may be mentioned that it is not necessary to either stop the machine or lift up the feeding rubbers to stop the feeding ; simply by a thumb-screw the levers are put out of action, and the machine can be kept running. To continue with the setting of the feeder, the tapes which take the sheets from the board, of which there are five or six, should be placed in position, one about 2 inches or 3 inches from each end of the sheet, and the other three proportionately ; the brass curvers should then be placed in a similar manner, care being taken to fix them as near to the cloth-covered roller as possible. The underneath tapes should then be set—the runner of the tape next to the underneath guide should be close up to the guide ; about twelve of these tapes are on the feeder, and it is advisable to use as many as possible, one being placed so that the edge of the sheet opposite to the feeding edge will rest on it when travelling to the machine. These tapes should always be kept tight, or the sheets will sag in between them and enter the machine crooked ; and the roller on which the tapes run should be tightened up at the opposite end to the guide, so that the

tapes will run in a slanting direction towards the guide, thus drawing the sheets to the guide and straightening them before they enter the machine. Unless the sheets are fed from the feeding board very crooked indeed, there is no fear of the sheets running up the guide ; another tape is fixed to prevent this, which runs on the top of the sheets and also assists in straightening them. This explanation may seem to the reader a little confusing, and probably create an impression that setting the feeder takes a long time ; but, as a matter of fact, it only takes about five or ten minutes, and these instructions will be found practicable and useful in the actual operation.

GENERAL REMARKS.

The makers of these feeders are invariably very obliging in making any alterations which may be required. A few suggestions here may be useful to an intending purchaser. In the first place, the knives should be thoroughly hardened, so that they will break before they bend, and should be made spear-shaped in order to be reversible ; the narrower the knife, the better the result. It is impossible to use these feeders successfully if the points of the knives are continually turning up, or if they are not kept very sharp, so that they will cut easily. With reference to the tapes which take the sheets from the feeding board, these are usually made of cloth very neatly joined ; these tapes are all right when new, but with constant use they lose their strength and become slack and of no use, and the operator has either to get new ones or make the best use of what substitute he may have. By far the better material for these tapes is a good rubber band, as wide as the original tapes and sufficiently long, so that when in position they will not be stretched too much, but sufficient to have a good grip on the sheets, and providing the tapes are made all the same length, a better and more uniform amount of grip is maintained, which is most necessary. The most modern English feeders are now made with these tapes.

The tapes underneath the feeding board can be made of any kind of strong tape, but the joining is of importance. There are several kinds of tape couplers on the market, but these tapes well sewn together are by far the most serviceable, and certainly the most economical. The thumb-screws are usually made round with a rough edge. It is almost impossible to tighten these screws sufficiently with the thumb and finger, especially when they have been in use some time. A flat thumb-screw is much better. There are four curvers usually provided. We strongly recommend two additional ones, for this reason—in the case of double cap sheets, or sheets as large as the feeder will take, that is, in width, these have to be fed to the short edge, perhaps one-third the length of the sheet; when the curvers are set in position there is too much room between each one, consequently the edges of the sheets catch the tapes and are knocked crooked, and owing to the sheets being so long and the feeding edge so short, they invariably get drawn straight to the guide. Two more curvers will prevent this. The “Imperial” feeders are all made with sufficient curvers.

ADVICE TO THE OPERATOR.

A few words of advice to the operator will perhaps be found useful. The knives need particular emphasis; they must always be kept sharp and in good condition. All the tape runners should be well oiled, so that they do not stick. If the feeder has not been used for a few days the face of the feeding rubbers will become hard and smooth; even some kinds of paper will produce this effect. Rubbing with a piece of rough sand-paper will restore them to their proper condition. Neglect of these things will result in many lapped sheets. The feeding board should be regulated to rise to the top of the eccentrics; this is done by a thumb-screw at the side. If the operator will adopt the few foregoing methods he will experience no trouble whatever, and will never regret making the acquaintance of the self-feeder.

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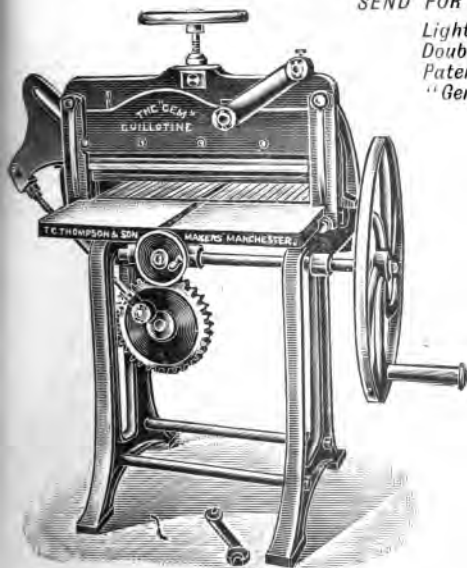
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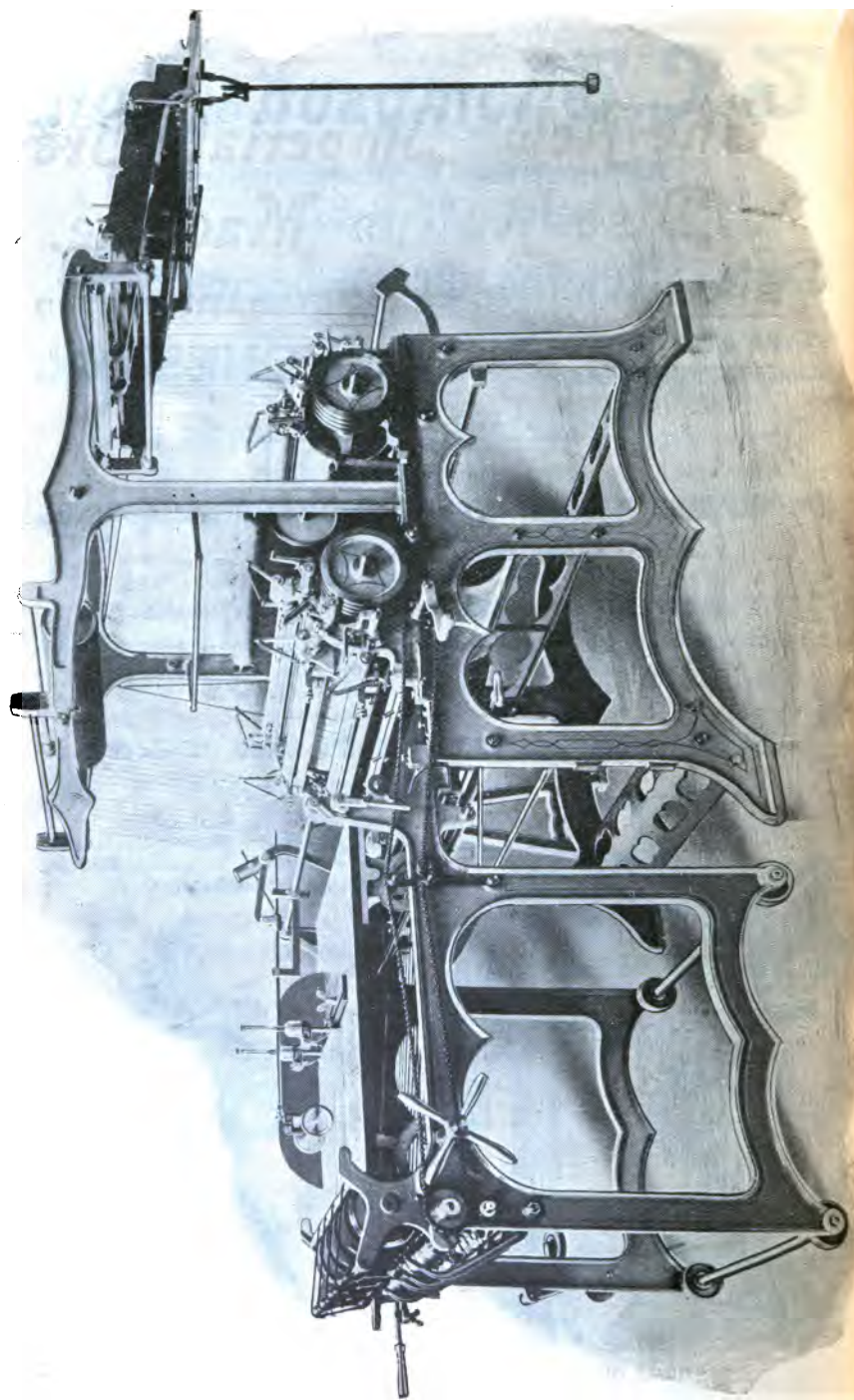
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